The Metals REVIEW

OWNED AND PUBLISHED BY THE MEMBERS OF THE AMERICAN SOCIETY FOR METALS

THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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New Alloy Steel For Vitreous Enameling Eliminates Base Coat

A new vitreous enameling alloy steel, known as Inland Ti-Namel steel, is announced by Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill. White and other colors of vitreous enamel can be applied directly to the new steel without the prior application of a base or ground coat enamel. This achievement is explained in the fact that a thinner covering of enamel produces a better surface, less liable to chip and with longer service life than the old, more costly multi-coat.

Deep drawn part 8 in. in diameter by 7½ in. deep made from 18-gage Inland Ti-Namel steel, formed in two operations without intermediate annealing and given one coat of enamel.

In the past when enamels were applied without a ground coat directly to standard enameling stocks of former days, and fired, the resulting finishes were found to be full of black specks, enamel pits and enamel blisters. This condition was caused by gases resulting from the reaction of carbon in the base metal with certain constituents in the enamel when at firing temperature. Inland, with the cooperation of the Titanium Alloy Manufacturing Co., conducted an extensive research program with the object in view of preventing the formation of such gases and thus eliminating the black specks, enamel pits and blisters.

It was found that titanium when added in a quantity dependent upon the amount of carbon in the base of the metal, would eliminate the cause for pitting, black specking and blistering. The titanium combines with the carbon in the steel to provide titanium carbide which is stable, and the titanium may also combine with the hydrogen entering the steel to form titanium hydride, which is also stable.

Indications are that the drawing properties of the new steel are equal to the best deep drawing iron and steel sheets, including the carbon steel sheets furnished to the automotive industry. Another important property of this new enameling alloy steel is that it does not strain age. Drawn shapes are free from strain

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See Additional New Products on Pages 20, 22, 23

PASS-A-ROUND

Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention—and Pass-A-Round.

Name	Item No.	Check

File or Clip for Future Reference

This is a record of important new developments in the metal industry during the past month—Save it!

Compliments

To FREDERICK STEELE BLACKALL, JR., president of Taft-Pierce Mfg. Co., Woonsocket, R. I., on his election as president of the New England Council.

* * *

To PAUL B. GREENAWALD and GEORGE V. LUERSSEN on their promotions by Carpenter Steel Co., Reading, Pa.; Mr. Greenawald to general superintendent of mill operations and Mr. Luerssen to assistant chief metallurgist.

* * *

To FREDERICK G. SEFING, research metallurgist, International Nickel Co., New York, on his selection to present the official A.F.A. annual exchange paper to the 1945 meeting of the Institute of British Foundrymen.

* * *

To J. O. ALMEN, head of mechanical engineering dept. 1, General Motors Research Laboratories, on the award of the Manly Memorial Medal by the Society of Automotive Engineers for his work in increasing the working strength of metals and engine parts.

* * *

Ten-Week Course on Fundamentals Being Given in Grand Rapids

A free course on the "Fundamentals of the Metallurgy of Steel Treating" is being given in Grand Rapids, under the sponsorship of the West Michigan Chapter A.S.M. by L. J. Haga, chief metallurgist of the Kaydon Engineering Corp., formerly with the metallurgical department of Purdue University and the Illinois Institute of Technology.

Meeting dates for the ten lectures are Jan. 8, Jan. 22, Jan. 29, Feb. 5, Feb. 12, Feb. 26, March 5, March 12, March 26, and April 2. The course will cover the nature of metals, fabrication and properties, solid solutions and compounds, the metal iron, the iron-carbon equilibrium diagram, time-temperature-transformation diagrams (S-curves), and heat treatments of steel. The series is planned as an A.S.M. service to the community and is not limited to members.

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Clad Steels Combine Corrosion Resistance, Strength, Ductility

Reported by F. G. Wayman
Chemist, The Steel Co. of Canada, Ltd.

While inexpensive carbon and low alloy steels offer desirable physical properties for engineering needs, another property is added to them—protection against chemical attack—when a corrosion resistant metal such as nickel is bonded to them to make clad steels, Dr. William G. Theisinger declared before an audience of 190 at the Nov. 6th meeting of the Montreal Chapter A.S.M. Dr. Theisinger is assistant to the vice-president of Lukens Steel Co., Coatesville, Pa.

"Clad steels possess the combination of corrosion resistance, tensile strength, and ductility, at a moderate cost," Dr. Theisinger stated, "and thus have made it possible to produce pressure vessels and tanks that will last many years, at a cost far below that of solid corrosion resistant metals. By employing only a fraction of the total thickness of the special metal needed for pressure vessels, clad steels have made scarce materials available for a greater number of vessels.

Nickel Bonded to Steel

"Clad steels," Dr. Theisinger explained, "are produced by attaching pure nickel or other chemically resistant metal firmly to commercial quality steel by heating the assembled plates to a high temperature and rolling them in large plate mills. This process attaches the nickel to the steel over the entire area so that the metals are permanently bonded together. Usually the special metal makes up 10% of the total thickness of the composite plate, so that there is a definite thickness of this corrosion resistant material to withstand chemical action or to protect the product from contamination.

"Steel is being clad with nickel, monel, inconel, silver, copper, and many of the stainless steel types. These clad materials can be machined, gas cut, rolled to shape, welded, stress relieved, or prepared for other operations. In welding them into a vessel, the steel side is welded with a steel electrode and the clad side welded with an electrode comparable to the composition of the corrosion resistant material."

Dr. Theisinger's talk was supplemented by slides and a full-color motion picture, "The Manufacture of Lukens Clad Steels," which showed assembly and prep-

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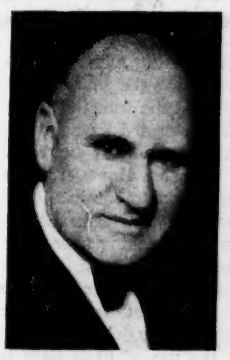
Jeffries Elected G.E. Vice-President To Head New Chemical Department

Zay Jeffries, technical director of the lamp department of General Electric Co., Nela Park, Cleveland, has been elected a vice-president of the company and will assume charge of a new chemical department, being established in Pittsfield, Mass. Dr. Jeffries, who has been with G. E. since 1914, is also chairman of the board of the Carboloy Co., and a director of General Electric Vapor Lamp Co. From 1915 to 1936 he was also consulting metallurgical engineer for Aluminum Co. of America.



Zay Jeffries

Dr. Jeffries is a past national president of the American Society for Metals and received its Sauveur Achievement Award in 1935, and the Gold Medal of the A.S.M. in 1943. He is a trustee of Case School of Applied Science, has been a member of the National Academy of Sciences since 1939, and is vice-chairman of the War Metallurgy Committee.

Demonstrations of Identometer, Spark Test, Comparator Follow Baxter's Talk on Control

Above—H. B. Brown is quizzed by Boston Chapter members after his demonstration of the Identometer. Right—Past Chairman Jim Baxter grabs the microphone during his stirring talk on "Metallurgical Control". Photographs by H. E. Handy.

Reported by Horace Ross
Henry Disston & Sons, Inc.

James V. Baxter, superintendent of inspection, United Shoe Machinery Corp., and past chairman, Boston Chapter A.S.M., analyzed "Metallurgical Control in Industry" at the Boston meeting on Dec. 1 from the following angles: Amount of control necessary; amount of money to be spent for it in relation to the value of the product; length and complexity of the manufacturing cycle; and possible troubles arising from the use of faulty material or unsuccessful control of processing.

Specifications for material were discussed and it was urged that attention be given to the tendency to supply material on the basis of required hardenability and performance characteristics. Thus common sense should be exercised lest the hands of the steel producer be tied by narrower specifications than actually required.

After the material has been ordered, other questions come up: Is the material the kind ordered? Is it sound and free from defects? What are its manufacturing characteristics? Do the finished parts made from it perform as they should?

Appropriate reference was made to chemical analysis, certification by the vendor, the spark test and the use of the Identometer. The proper use of macroetch and fracture tests, and the role of microstructure and the relation between as-rolled and austenitic grain size with particular reference to machinability in the course of manufacture were shown. The use of the Jominy end-quench test and, in the case of tool steel, the Shepherd P. F. characteristics in their relation to hardenability and the desired qualities of the finished product, were outlined.

In addition to ample slide illustrations, actual demonstrations were made of the spark test and the Identometer and G. E. magnetic comparator, the latter two by H. B. Brown of the Metals Service Co.

The subject for the talk had been prompted by various problems submitted to the War Products Advisory Committee of the Boston Chapter in inquiries from the smaller war plants. It was kept to the practical viewpoint of the man in the shop and well-exampled by concrete problems in wide variety. It could well be described as a short course in metallurgical control complete in one lecture.

New M-2 High Speed Claimed To Be Stronger, Cheaper

Reported by Herman P. Abel
Metallurgical Laboratory, Delco Remy Div., G. M. C.

In spite of last-minute changes in meeting arrangements, and a blinding snow storm, 35 members of the Muncie Chapter braved the icy hills surrounding New Castle, Ind. to hear R. K. Warren, metallurgist at the Sanderson Works of Crucible Steel Co. of America, talk on "Latest Developments in the Evolution of Modern High Speed Steel" at the December meeting.

Mr. Warren reviewed the chemical analyses, experiments, changes, and developments of tool steels up to our time. He then introduced the new M-2 high speed steel which some midwestern plants have adopted and others are testing. He related the chemical, metallurgical, and cost analyses of this new steel, and compared it with other steels manufactured for the same purposes. According to all reports this steel seems to be stronger, easier to heat treat, has longer life, and is cheaper than steels we are using at the present.

Chairman Hahn announced the result of votes which showed that this Chapter will buy memberships for the public libraries of Anderson, New Castle, and Muncie, and will equip each library with a complete set of metallurgical books.

Martempering a Result of Knowledge of Transformations

Reported by Warren A. Silliman
Chief Metallurgist, Cleveland Tractor Co.

"Martempering," the subject of B. F. Shepherd's talk before the Cleveland Chapter on Nov. 6, is not a new practice, the speaker pointed out, but has been used for years without the principles being known. Martempering, as it exists today, has been a result of the expanded knowledge of the mechanism of martensite transformation, quenching rates and hardenability data.

The process consists of cooling the material in a bath slightly over 400° F. to stabilize the temperature. The work is then cooled in air and the transformation takes place to completion at this elevated temperature.

Cooling speeds can be varied somewhat by regulating the agitation of the quench. However, it is possible to have too rapid agitation to obtain a good quench. The salt baths used in martempering in general have a slightly lower quenching rate than oils. Mr. Shepherd also pointed out that greater distortion is generally encountered in faster quenches and that it is best to use the lowest hardenability material which will do a satisfactory job.

He also pointed out that the use of little alloy is often more desirable than the use of a lot of alloy. Tempering is the minor operation in the heat treatment of steel. Hardening a piece properly with special attention to the quench is by far the most important.

For the coffee talk, K. R. Van Horn presented movies showing the highlights of the 1943 football season and pictures of the liberation of Paris.

Slides Show Tremendous Volume Of Parts Being Induction Heated

Reported by George F. Kappelt
Metallurgist, Bell Aircraft Corp.

"Induction Heating at War Today and at Peace Tomorrow" was the title of the talk delivered by Harry B. Osborn, Jr., research engineer with the Tocco Division of the Ohio Crankshaft Co., at the November meeting of the Buffalo Chapter.

Dr. Osborn traced the development of induction heating from its origin more than 40 years ago, to the types of machines with their hundreds of applications that are used today.

Dr. Osborn's talk, which has been reviewed in previous issues, was concluded with the showing of many slides which illustrated the tremendous volume of parts that can be handled by induction heating units.

Serves in Office of Economic Affairs

John W. Barnet has left the Foreign Division of W.P.B. to be metal specialist in the Office of Economic Affairs, Department of State, Washington, D. C.

New York Chapter Has Lecture Series On Powder Metallurgy

Reported by G. A. Landis
E. W. Bliss Co.

Capacity attendance marked the educational series of four lectures on "Powder Metallurgy" sponsored by the New York Chapter.

On Oct. 30, the most common methods of production of metal powders were described as follows: "Atomization Methods," by E. H. Kelton, New Jersey Zinc Co.; "Special Methods for Refractory Metals," by J. Kurtz, Callite Tungsten Co.; "Electrolytic and Reducing Methods," by J. J. Cordiano, Hardy Metallurgical Co.

Atomization is applied primarily for low melting point metals such as magnesium, lead, aluminum, zinc, and occasionally copper and copper alloys (bronzes and brasses).

The high melting points of refractory metals, such as tungsten, molybdenum and tantalum, require treatment of ore by chemical methods to produce the oxide, which is then hydrogen reduced to produce the metal powder.

Electrodeposition is used frequently for copper and iron powder to obtain a hard, brittle deposit or a sludge-like deposit on the electrode.

Reduced iron powder is produced from steel scrap or iron oxide which is pulverized and reduced at 700 to 1000° C. A higher purity product can be obtained by using Armco iron leached with sulphuric acid. The iron sulphate produced is reduced and then the iron is crushed and packaged, yielding 99% iron. The chief impurity in products of both processes is iron oxide.

Bailey and Bostwick Describe Equipment

On Nov. 6, equipment for powdered metal compacts was described by L. H. Bailey of F. J. Stokes Machine Co., and H. C. Bostwick, of Westinghouse Electric and Mfg. Co.

Pill and life-saver machines provided probably the earliest mechanized equipment for making powder compacts. One hundred tons is the maximum capacity of the cam motion machines. Hydraulic presses of greater capacity, such as 300 tons at 12 strokes per min., are also available.

Pressures are normally 20 to 50 tons per sq. in. for compression of powder. Dies are made of carbides, high carbon high chromium die steels, or other special die materials. Life of dies varies, but 100,000 to 500,000 pieces per die are frequently obtained.

Furnaces serve two purposes in the field of powder metallurgy: First, to reduce any oxide or bond-obstructing film; and, second, to sinter or bond the compact. Atmosphere generators to give the desired protective or reducing conditions are normally as essential as the furnace and hearth construction itself.

Typical Specimens Displayed

On Nov. 20, W. J. Hayman of Powder Metallurgy Corp. discussed the commercial aspects, limitations and advantages of powder metal compact production, giving examples and exhibiting typical products. Major considerations in selecting the powder metal process of manufacture are quantity, design, equipment, and economics.

On Nov. 27 J. F. Kuzmick of Stevens Institute of Technology discussed the numerous present-day uses of powder metal compacts and exhibited a fine collection of typical specimens, including cemented carbides, porous bearings, alnico magnets, cores, and extremely ductile iron subsequently rolled into 0.003-in. strip.

Active participation in this course through questions and contributions from the groups assembled each evening added considerably to the worth and success of these educational lectures. A real contribution has been made not only by the wider dissemination of knowledge in the field of powder metallurgy in the New York area, but also a striking example of the response on the part of the members to a course they selected by ballot was evidenced by the fine attendance.

Appointed to St. Louis Executive Committee

B. James Cahill, Production Tool and Supply Co., has been appointed to the Executive Committee of the St. Louis Chapter to serve the unexpired term of William Robards, who has transferred to the Milwaukee Chapter. Mr. Robards' duties as chapter reporter are being taken over by Samuel N. Hunter, Standard Steel Spring Co.

Col. Enos Outlines Problems & Policies Of Ordnance Inspection

Reported by C. A. Nagler
Instructor in Metallography, University of Minnesota

Lt. Col. George M. Enos of the Cincinnati Ordnance District addressed the largest attendance for the 1944-1945 season of the Northwest Chapter when he spoke on "Metallurgical Inspection in Ordnance" at the November meeting.

At the outset the Colonel described the policies and problems of the Ordnance Department in regard to inspection. The policies can be summed up by stating that: (*a*) Inspection of ordnance materiel is nation wide; (*b*) it is carried out at all plants manufacturing for the Ordnance Department; (*c*) the department avoids discrimination; (*d*) it has a uniform national policy.

Ordnance products may be divided into two types: Those that function once, and those that function many times. An example of the first is ammunition, and an example of the second is a tank or gun.

On all fighting equipment inspection is rigid both by the contractor and by ordnance. This duplication of inspection is necessary where function and safety are involved. Public funds are used for the purchase of ordnance equipment and it is the duty of the ordnance inspector to make sure the public gets its money's worth.

All ordnance products are made to definite specifications. Any deviations are generally in the interests of the government and not the manufacturer. At times of emergency ordnance inspectors may be authorized to accept products which are good enough to do a job even though they are not up to par, but Ordnance does not regularly accept sub-standard material from a manufacturer.

On acceptance tests Ordnance does not encourage needless repetitive tests; generally the test results of the manufacturer are accepted. The Ordnance Department, under these conditions, will test in case of doubt or to check safety of product. The Department is making good use of quality control by standard sampling methods and thereby reduces inspection to a minimum while still assuring full quality.

The Colonel made a point that the A.S.M. did much in training ordnance inspectors by means of lectures and educational courses.

It was interesting to follow the various inspections that are carried out on a heat of steel from the charge through the various operations necessary to fabricate some useful ordnance equipment. The various metallurgical tests used were described and a number of the common metallurgical defects were illustrated, particularly samples of etched discs.

Predicts Lost-Wax Casting Of Broaches and Cutters

Reported by Arthur H. Nuesse
Wesley Steel Treating Co.

The lost-wax method of producing precision castings was described by Howard Taylor, senior metallurgist of the Naval Research Laboratory at Anacostia Station, Washington, D. C., before the Nov. 21st meeting of the Milwaukee Chapter.

This method of duplication, used 400 years ago but rediscovered at the turn of the century, has been employed in the casting of inlays and dentures and the manufacture of jewelry. Small castings are now being produced with accuracies of from less than 0.001 up to 0.005 in. or more. While present methods are best employed on items weighing from 1 oz. up to 2 lb., castings up to 15 lb. have been made experimentally and it is believed that really large castings eventually will be possible.

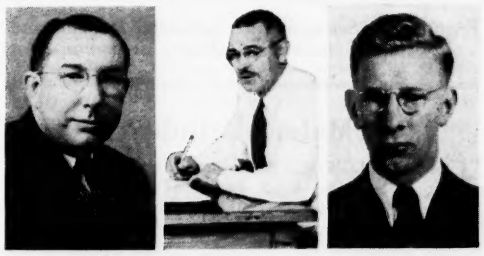
The initial cost of precision casting is much higher than by the rough sand method, but the elimination of machining makes the final cost compare favorably.

Mr. Taylor predicted that the manufacture of broaches, reamers and milling cutters by the lost-wax method is a possibility which may revolutionize present-day production ideas.

Edw. S. Christiansen Co. Formed in Chicago

Edward S. Christiansen has announced the formation of the Edward S. Christiansen Co., Chicago, for the purpose of buying and selling magnesium and aluminum scrap and finished materials. For the past 3½ years, Mr. Christiansen has been a principal stockholder and held the offices of vice-president, director, and sales manager of the Apex Smelting Co.

Officers of Cedar Rapids Chapter



H. Hauseman Chairman — *G. H. Taylor* Secretary-Treasurer — *R. W. May* Vice-Chairman

Cohen Relates Research to Practical Treatment of Tools

Reported by Lawrence Jacobsmeyer
Technician and General Manager, Salkover Metal Processing

"The Practical Heat Treatment of High Speed Steels in the Light of Recent Research," with emphasis on structure rather than chemistry, was the subject of Prof. Morris Cohen's lecture to the Chicago Chapter on Dec. 14.

Starting with the annealed structure of carbide in a ferrite matrix, and heating to the hardening temperature; the structure is changed to austenite plus undissolved carbides. Should the subsequent cooling cycle be slow enough to intercept the upper transformation curve in the S-curve diagram at 1300° F., we will have a structure that is composed of a mixture of constituents and the result will be an embrittled tool. If we cool sufficiently rapidly so as not to intercept the upper C-curve of the S-curve diagram and stop the cooling in the intermediate temperature range of approximately 1000° F. we can hold for extended periods of time without important transformations.

Martensite Transformation Is Progressive

At 425° F. we pass the first martensite transformation point, and at 400° F. we have approximately 10% martensite formed which increases progressively down to room temperature. The martensite transformation point depends upon the composition of the austenite as related to hardening temperatures. Austenite that is rich in carbon will transform at lower temperatures to martensite. Martensite is formed on cooling and not on holding at any one temperature over an extended period of time.

Austenite transformation in tempering is accompanied by a volume increase, and it has been noted that hot hardness of high speed steel is the highest when volume increase is the greatest. This means that we should temper to maximum austenite transformation for maximum hot hardness values.

A very interesting discussion on the sub-zero treatment of high speed was given by Professor Cohen, who described the transformations that occur during such treatment. The discrepancies that have been reported with the use of the sub-zero treatment were discussed and the consensus was that once applied properly it may become an important tool to the heat treater. There is the possibility that something other than austenite decomposition results from a sub-zero treatment and gives the beneficial effect reported by many users.

Steel Failures Caused by Accidental Inclusions (Foreign Material)

Reported by Sherman R. Lyle
Metallurgist, Timken Steel & Tube Co.

Speaking on "Inclusions in Steel and Their Relationship to Steel Practice" before the Canton-Massillon Chapter on Nov. 16, C. E. Sims, supervisor of metallurgy at Battelle Memorial Institute, identified inclusions as belonging to two general classes: Natural (formed on solidification), and accidental (foreign material in the steel).

The size of the natural inclusions which are formed on freezing of the melt depends upon the rate of cooling of the casting—that is, the slower the cooling the larger the inclusions. The different natural inclusions, such as oxides, sulphides, and silicates, as well as a number of accidental inclusions, were illustrated by slides and their identification and formation explained.

The effect of hot working the steel on the inclusions was also shown. It was the speaker's belief that very few failures in service can be attributed to the natural inclusions while many can be caused by the accidental type.

Varied and interesting questions were asked in the discussion period led by Gilbert Soler.

Focke Gives Charter To New ASM Chapter In Cedar Rapids

Reported by Henry Hauseman
Metallurgical Engineer, LaPlant-Choate Mfg. Co., Inc.

At a dinner meeting in the Hotel Roosevelt on Dec. 12, 1944, attended by 130 members and guests, A. E. Focke, a national trustee, presented the newly formed Cedar Rapids Chapter of the American Society for Metals with its charter. In his presentation talk Dr. Focke discussed the "Reasons That Make the American Society for Metals Click".

Henry Hauseman, chairman pro tem, accepted the charter in behalf of the local chapter, mentioning the fact that Cedar Rapids won the first Treasury Department "T" flag, and that its industries hold more Army and Navy "E" awards than any city of its size.

Following the charter presentation, the following permanent officers were elected:

CHAIRMAN: Henry Hauseman, metallurgical engineer, LaPlant-Choate Mfg. Co., Inc.

VICE-CHAIRMAN: R. W. May, chief mechanical design engineer, Collins Radio Co.

SECRETARY-TREASURER: G. H. Taylor, chief inspector, LaPlant-Choate Mfg. Co., Inc.

EXECUTIVE COMMITTEE: A. R. Locke, chief inspector, Fruehauf Trailer Co.; R. F. Plumb, mechanical engineer, Iowa Manufacturing Co.; M. B. Heisner, production engineer, Universal Engineering Corp.; H. F. Allen, chief engineer, Link-Belt Speeder Corp.; John Fielding, department of Mechanical Engineering, State University of Iowa; J. C. Falcon, assistant factory superintendent, Cedar Rapids Engineering Corp.

Dr. Focke, who is research metallurgist, Diamond Chain and Manufacturing Co., now doubling as the technical speaker for the evening, presented his talk on "Fatigue of Metals". Dr. Focke first reviewed the fundamentals of fatigue testing and the use of S-N diagrams. The design and use of special equipment for fatigue testing roller chain, a product of the author's company, was comprehensively described. The effects of shot peening and corrosion on endurance limits were shown.

Opens Consulting Office in Detroit

A. Di Giulio has opened an office as consulting chemical and metallurgical engineer at 1155 Book Bldg., Detroit 26, Mich. Dr. Di Giulio is a past chairman of the Detroit Chapter A.S.M. and has taken an active part in Society activities.

Manitoba Holds Three Special Meetings on Castings

Reported by E. M. Evans
MacDonald Bros. Aircraft Limited

Three special meetings on the subject of castings were held by the Manitoba Chapter during late November. On Nov. 21 John Isbister, Vulcan Iron Works, Ltd., Winnipeg, was host to approximately 110 members, who heard a talk on steel castings by John Olafsson, chief metallurgist.

The party was then arranged in groups of ten and shown through the shell shop and foundry. A melt of steel was poured while the party was in the foundry. Mr. Thornycroft, foundry foreman, answered questions on molding, and then the party returned to the general office for sandwiches and coffee.

Anthes Foundry, Winnipeg, was visited on Nov. 23 through the courtesy of Allan McCallum, manager. Among many interesting things here, the party saw the pouring of cast iron balls used in ball mills in mines to crush the ore. Mr. McCallum gave an interesting talk on "Pattern Making and Molding Practice in a Cast Iron Foundry."

On Nov. 27, Mr. MacLuckie of the Winnipeg Brass Co. gave a talk on "Non-Ferrous Castings" at the Marlborough Hotel, where he had a large number of interesting castings on display. The evening was concluded by a round table talk with Mr. Olafsson, Mr. McCallum and Mr. MacLuckie answering questions in their respective fields.

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month

1. PRODUCTION OF METALS

1-148. **Ore and Coal Handling on the Lower Great Lakes.** A. E. Gibson. *Steel*, v. 115, Nov. 27, '44, pp. 94-96, 98.
How iron ore deposits of the Mesabi range have played a part in the industrial development of the United States.

1-149. **The Electrochemistry of the Dow Magnesium Process.** Ralph M. Hunter. *Canadian Chemistry & Process Industries*, v. 28, Nov. '44, pp. 737-741.
Design and operation of the Dow electrolytic cell for electrolyzing fused magnesium chloride. 8 ref.

1-150. **Hydrometallurgical Treatment of Cobalt Ores.** B. Du Four. *Chemical Age*, v. 51, Nov. 4, '44, pp. 443-444.
Conversion to soluble sulphates.

1-151. **Metallurgy of Liquid Steel.** B. B. Rosenbaum. *Industrial Heating*, v. 11, Dec. '44, pp. 2042, 2044, 2046.
Problems in manufacture of acid open-hearth steel.

1-152. **Smelting of Krivoyrog Lump or Powdered Ore in a Charge Mixture.** Hans Reinfeld. *Stahl und Eisen*, v. 64, April 6, '44, pp. 217-222.
Smelting of iron ore received in large quantities from Krivoyrog (Russia) during the years 1942 and 1943 was found to be very difficult. After a series of investigations described in this article, a method of handling such ore, sizing it, and sintering, showing very satisfactory results was developed.

1-153. **Basic Electric Melting for High Quality Alloy Steels.** A. L. Ascik. *Canadian Metals & Metallurgical Industries*, v. 7, Dec. '44, pp. 26-33.
Steel-making a battle against oxygen. 5 ref.

2. PROPERTIES OF METALS

2-42. **Light Metals Versus Plastics.** Ronald Fleck. *Light Metals*, v. 7, Nov. '44, pp. 518-521.
Relative positions of aluminum alloys and synthetic resins.

3. PROPERTIES OF ALLOYS

3-234. **A Study of Several Kinds of High Strength Plate Steel.** George F. Comstock. *Metal Progress*, v. 46, Dec. '44, pp. 1248-1253.
Titanium has been substituted for the strategic vanadium in the high strength weldable steel plate used by the U. S. Navy for hull construction. Extensive tests on 19 laboratory heats of these two and other types of steel that have been used or suggested for high strength plate.

3-235. **The Mechanism of Failure of 18 Cr-8 Ni Cracking Still Tubes.** C. L. Clark and J. W. Freeman. *National Petroleum News*, v. 36, Dec. 6, '44, pp. R-854-R-856, R-858, R-859, R-860, R-862.
The deterioration and possible actual failure of 18% Cr, 8% Ni cracking still tubes in service is due to structural changes at the grain boundaries which are progressive in nature and are dependent on time, temperature and stress.

3-236. **18-8 Stainless Modified for Formability.** Wilson G. Hubbell. *Iron Age*, v. 154, Dec. 7, '44, pp. 78-82.
Columbium stabilized stainless steel, type no. 347, possesses proper ductility and good welding properties on the basis of tests described for forming aircraft parts subject to high temperatures.

3-237. **The Influence of Melting Conditions on the Physical Properties of Steel Castings.** H. T. Protheroe. *Metallurgia*, v. 30, Oct. '44, pp. 307-310.
Mechanical test results obtained from a number of cast steels. Examination of the data recorded during manufacture made and used in connection with mechanical test results in an effort to trace the factor or factors having the most pronounced influence on the quality of cast steel.

3-238. **How Fast Do Metals Freeze?** Harry A. Schwartz. *Foundry*, v. 72, Dec. '44, pp. 80-81, 236, 238, 240, 242, 244.
Experimental work on rate of solidification of steel castings. Variations in these findings and acceleration in freezing rate with passage of time may be accounted for by the contribution made by radiation and convection on apparent thermal conductivity.

3-239. **Retaining Physical Properties with Composition Change.** Thomas D. West. *Foundry*, v. 72, Dec. '44, pp. 93, 226, 230, 232.
In considering a change in alloying elements factors which must be considered when the same physical properties are to be met are listed in the order of their importance; selection of alloys; correct deoxidants and deoxidation practice; and heat treatment. 2 ref.

3-240. **The Influence of the Centrifugal Process on the Physical Properties of Some Non-Ferrous Alloys.** W. W. Edens and J. F. Klement. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 393-406.
Data obtained in tests made with various non-ferrous alloys, sand cast, centrifugally cast and forged. Densities, chemical analyses, microstructures and tensile test values. Photomicrographs to show the variations in the microstructure and tables to show the differences in analyses and physical properties.

3-241. **The Effect of Copper in Some NE and Low-Alloy Cast Steels.** C. T. Greenidge, M. C. Udy, and K. Grube. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 501-516.
Copper was added to three low alloy, 0.30% carbon, cast steels in amounts up to 0.50% and to a fourth steel in amounts up to 1.35%. First three steels corresponded to NE 8630 and 9430 grades and to a manganese-molybdenum type, while the fourth approximated an NE 8700 composition. Steels tested for hardenability by the end-quench or normalizing followed by tempering. Low temperature notched bar toughness determined on specimens similarly heat treated. 9 ref.

Materials Index

THE FOLLOWING tabulation classifies the articles annotated in the A.S.M. Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

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3-242. **Thin-Wall Steel Casting in Machine Construction.** K. Rudnik and H. Juretzek. *Maschinenbau, Der Betrieb*, v. 21, '41, pp. 217-21; *Chem. Zentr.*, II, '41, pp. 1550-1. *Alloy Metals Review*, v. 3, Sept. '44, p. 2.
To replace nickel alloy materials, new Cr and Cr-Mo steels have been developed. In order to save Mo, steels containing 0.1% Mo and 0.1% V were developed. By various heat treatments, steel containing 1% Cr and 0.1% Mo of 60 to 75, 75 to 90, and 90 to 110 tensile strength can be obtained. In special cases, 110 to 125 tensile strength was obtained for thin-wall specimens of small dimensions. For larger parts, oil-tempered steel containing Cr 1.8% and Mo 0.3% is employed. High impact strength is found in a steel containing 2 to 3% Cr and 0.5% Mo. Wear resistance is increased by addition of 1.5% Mn. Hard steels of 75 to 90 tensile strength for thin wall specimens may contain up to 12 to 14% Mn. High endurance limit and resistance to heat and corrosion are found in steels containing 15% Cr and up to 0.5% Mo. Cr-Mo-V and Mn-Cr cast steels have very high endurance limit. Steels containing 30% Cr with and without Mo are resistant to strong acids and alkalies. Steels containing 14 and 18% Cr combine high yield point with high elongation values and high break points. Fields of application in the construction of vehicles, naval engines, high-pressure boilers, and aircraft are listed.

3-243. **The Behavior of Metals Deformed by Compression.** F. Körber, A. Eichinger, and H. Möller. *Mitteilungen aus dem Kaiser-Wilhelm-Institut für Eisenforschung*, v. 26, no. 6, '43, pp. 71-89. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 161-A.
An investigation of the effects of previous cold-compression on the ductility of mild steel and cast steel has already been reported (See *Journal* Iron and Steel Institute, no. 1, '43, p. 197-A). In the present paper tests are described the object of which was to study how deformation at 100°, 250°, 400°, 550° and 700° C. by longitudinal and transverse compression followed by two months aging affected the properties of very low carbon steel. The brittleness increased with increasing deformation temperatures up to 400° C., but there was no embrittlement after compression at 700° C. It is not the deformed structure alone which is responsible for the embrittlement, but the lattice distortion, the extent of which depends on the temperature of deformation. Factors which also contribute to the embrittlement are the sensitivity to aging which depends on the amount of aluminum added to the steel, and the weakness which develops at the grain boundaries resulting in a transverse preferred orientation after compression.

3-244. **The Susceptibility to Aging of High-Tensile Structural Steels.** A. Fry and L. Kirschfeld. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 87, March 6, '43, pp. 123-127. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 162-A.
An investigation of the aging properties of high-tensile steels was carried out to determine whether they had any tendency to become brittle after plastic deformation. Basic open-hearth steels made by the normal process had a marked embrittlement tendency. Additions of more than the normal amount of aluminum to insure thorough deoxidation reduced this tendency; normalizing alone did not reduce it. The steels tested included specimens from the broken bridge over the Albert Canal in Belgium and the Zoo bridge in Berlin, and they afforded evidence of the importance of using non-aging steels for such structures.

3-245. **Avoiding Dimpling Failures in the New Aluminum Alloy Alclad 75S-T.** A. A. Bibee. *Iron Age*, v. 154, Dec. 21, '44, pp. 38-43.
Alclad alloy for airframe skins has a combination of strength and toughness superior to any of the aluminum alloys used up until recently. Designated as 75S, it contains approximately 90% aluminum, with magnesium, zinc and copper. In its heat treated condition, it is in general less readily fabricated than Alclad 24S-T. Accelerated corrosion tests have indicated that Alclad 75S-T resists corrosion as well as Alclad 24S-T. Stress corrosion cracking of Alclad 75S-T is not likely because of the electrolytic protection afforded by the cladding. None has been observed to date after a year's seacoast exposure of highly stressed, plastically deformed samples. Comparative typical properties of Alclad 75S-T and 24S-T are given.

3-246. **Physical Properties of Some National Emergency Steels. II.** William C. Stewart and Richard E. Wiley. *Iron Age*, v. 154, Dec. 21, '44, pp. 54-57.
Test data on the strength and creep of a number of NE steels and SAE 4140 at elevated temperatures with a view to determining whether they would meet Navy requirements for high temperature bolt steels. They do not.

3-247. **Engineering and Application of Magnesium Alloy Castings.** I. David Basch. *Aluminum & Magnesium*, v. 1, Dec. '44, pp. 15-19.
Modulus of elasticity and shear; wear and friction; sparking characteristics; fire hazard; health hazard; magnetic properties; effect of temperature; growth and distortion; creep; fatigue; and shock resistance.

3-248. **Properties of Aluminum Alloys Melted in Induction Heated Crucible Furnace.** James W. Poynter. *Aluminum and Magnesium*, v. 1, Dec. '44, pp. 20-21, 27-28.
Physical properties of aluminum casting alloys melted in a crucible furnace heated by induced high frequency electric currents were determined and compared with the properties of the same alloys melted in gas-fired crucible furnaces. (Paper read at 26th Annual Convention of American Society for Metals, Cleveland, Ohio, Oct. 1944.)

3-249. **Tensile Properties of Unstable Austenite and Its Low-Temperature Decomposition Products. A. H. Cottrell.** Iron and Steel Institute, Advance Copy, Nov. '44, 12 pp.
Mechanical properties and transformation behavior of an air-quenched nickel - chromium - molybdenum steel were studied at various stages before, during and after the austenite-martensite change. Part of the S-curve was determined as a preliminary to the investigation. Tensile properties of martensite obtained by air-quenching were examined during cooling and show that the material possesses high strength and appreciable ductility. Minimum ductility in the metal is obtained immediately after the completion of the change to martensite. These results are discussed briefly in relation to the problem of cracking encountered in this type of steel after welding. 12 ref.

3-250. **Special Cast Brasses as a Substitute Material.** E. Pelzel and R. Hanel. *Metall-Wirtschaft*, nos. 27-29, August 20, '43, pp. 383-393.
Series of strong brasses described. Comparative investigation of the properties of these alloys. Possibility of the improvement of such alloys by the addition of iron, nickel, and manganese emphasized. The alloys described are a cross between brass and the aluminum bronze family with a total Al+Fe+Ni+Mn up to around 3%.

3-251. **Static Strength, Elongation, and Brinell Hardness of Porous "Silumin Gamma" Sand-Cast Parts.** H. Reininger. *Metall-Wirtschaft*, nos. 27-29, August 20, '43, pp. 394-400.
The production of sand-cast parts of "Silumin" or other light-metal alloys without gas porosity is not always possible. Gas-porosity is in no way connected with penetrability of liquids or gases, and only the strength, elongation, and Brinell hardness of such material should be the criterion of its qualities. Experimental evidence is adduced to support this view.

4. STRUCTURE

4-44. **Preferred Orientation—an Asset and a Liability.** J. K. Stanley. *Metal Progress*, v. 46, Dec. '44, pp. 1254-1258.

Rolled or forged metal may have "fiber" due to segregation of metallographic constituents. Directional properties ("anisotropy," to the scientist) due to preferred orientation of the basic metallic crystals are seldom of advantage except in the production of magnetic silicon-iron sheet.

4-45. **Vanadium—In Gray Iron Castings.** R. G. McElwee and T. E. Barlow. *Foundry*, v. 72, Dec. '44, pp. 88-89, 246, 248, 250, 252.

Effect of vanadium on the graphite structure.

4-46. **The Structure of Hard-Metal Alloys.** W. Dawihl and J. Hinnüber. *Kolloid Zeitschrift*, v. 104, '43, pp. 233-236. *Alloy Metals Review*, v. 3, Sept. '44, p. 1.

Experiments were performed to explain the hardness and wearing qualities of hard-metal alloys, obtained by incorporating 6% Co in WC alloys. Determinations of the coefficient of expansion as a function of increasing volume percentage of Co showed up to about 10% Co little or no expansion; beyond 10% linear increase is noticeable. The bending strength plotted as a function of the applied sinter temperatures, for alloys with different (3, 6, 11%) Co percentages also indicated that the great rigidity of the hard alloys must be due to a strong WC framework which tends to be broken up as the Co content is increased beyond a certain limit.

5. POWDER METALLURGY

5-51. **Powder Metallurgy.** Earle E. Schumacher and Alexander C. Souden. *Metals and Alloys*, v. 20, Nov. '44, pp. 1327-1339.

History; manufacture; processing operations; products and applications; advantages and limitations. 68 ref.

5-52. **The Physics of Sinter-Metal Contacts.** R. Holm. *Kolloid Zeitschrift*, v. 104, '43, pp. 231-233. *Alloy Metals Review*, v. 3, Sept. '44, p. 1.

High-current switches operating under oil or water are suitably made from sintered W or Mo, saturated with molten Cu or Ag. For low-current switches sintered W is more suitable provided the applied e.m.f. is high enough to break the covering oxide film.

5-53. **Large Carbide Parts Formed by New Hot Pressing Method.** *Industrial Heating*, v. 11, Dec. '44, pp. 2024, 2026, 2028.

Development of a "hot press" method which incorporates in one single operation the processes of pressing, semi-sintering, and sintering.

6. CORROSION

6-61. **Special Corrosion Problems in Aircraft.** W. E. Donaldson. *Mechanical Engineering*, v. 66, Dec. '44, pp. 799-800.

Corrosion caused by direct chemical action, by dissimilar metal contact; concentrated corrosion cells; means of preventing corrosion; other corrosion problems.

6-62. **Rust Identification.** Ralph O. Clark. *Iron & Steel*, v. 17, Nov. '44, p. 679.

Testing surface deposits on iron and steel. 1 ref.

6-63. **Metallic Corrosion.** U. R. Evans. *Iron & Steel*, v. 17, Nov. '44, pp. 686-690.

Mechanism and methods of inhibition or prevention. 16 ref.

6-64. **Ammonia and Mercury Stress-Cracking Tests for Brass.** Gerald Edmunds, E. A. Anderson, and R. K. Waring. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 1, Nov. '44, 12 pp.

Stress corrosion test developed in which small brass specimens were externally stressed in tension while exposed to an atmosphere. The measure of the susceptibility of the specimen to stress corrosion is the time required for the specimen to break under the applied tensile strength. Time required for failure is a function of the applied stress. 6 ref.

6-65. **The Role of Smokeless Powder in the Season Cracking of Small Arms Ammunition.** J. W. Mitchell. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 4, Nov. '44, 9 pp.

Cracking tendency of ammonium salts and smokeless powder on two different lots of caliber 0.30 cartridge cases was found to differ in ratio with the stress level in these cases as measured by the mercury-cracking test. Stress-relief anneal of the cartridge case at 475° F. for 45 minutes reduced the severity of cracking considerably, although the number of internal cracks, that is, ones which do not penetrate completely to the exterior, was not greatly reduced. 2 ref.

6-66. **Residual Stress in Caliber 0.30 Cartridge Cases.** H. Rosenthal and J. Mazia. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 7, Nov. '44, 14 pp.

Investigation of residual stress in the head and body of caliber 0.30 cartridge cases. The head was divided into four ring-like sections which were cut off by a jeweler's saw. Spring-out was measured after a radial cut had relieved the circumferential bending moment. The residual stress corresponding to the observed spring-out was calculated by formulas in which the computed stress was a function of wall thickness. 6 ref.

6-67. **Symposium on Stress-Corrosion Cracking, Introduction.** E. H. Dix, Jr. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 9, Nov. '44, 4 pp.

Spontaneous cracking which results from the combined effect of high, prolonged stress, and corrosive attack.

6-68. **Factors Influencing the Stress Cracking of Brass Cartridge Cases.** George Sachs, George Espey, and S. M. Clark. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 13, Nov. '44, 21 pp.

Tendency of a commercially drawn cartridge case to crack in the mercury test and the relation of cracking tendency to residual stress retained after drawing studied; effect of a number of processing (drawing) variables on the cracking tendency investigated. 19 ref.

6-69. **Test Methods and Progress in the Stress-Corrosion Investigation at Wright Field.** Baxter C. Madden, Jr. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 14, Nov. '44, 22 pp.

Stress corrosion defined and certain examples illustrated. Test methods, to determine the resistance of materials to stress corrosion, being developed at Wright Field. The criterion as to validity of a method is stated. 22 ref.

6-70. **The Assessment of the Susceptibility of Aluminum Alloys to Stress Corrosion.** F. A. Champion. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 17, Nov. '44, 14 pp.

On exposing aluminum alloys to corrosive conditions with or without stress there may be an induction period during which no measurable loss of mechanical properties occurs. When measurable corrosion starts it follows an exponential law; it is not necessary to continue the tests to destruction in order to estimate the ultimate loss of strength. 13 ref.

6-71. **Discussion of Stress-Corrosion Testing Methods and Results.** Hiram Brown. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 18, Nov. '44, 4 pp.

Chemical composition and inherent corrosion resistance of the material have an important effect on the resistance to stress corrosion.

6-72. **A Generalized Theory of Stress Corrosion of Alloys.** R. B. Mears, R. H. Brown and E. H. Dix, Jr. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 20, Nov. '44, 17 pp.

Causes of localized attack; electrochemical measurements between grains and grain boundaries; effect of stress; nature of the stress; directional effects; stress relief; other studies supporting the electro-chemical theory; stress-corrosion cracking of plastics. 12 ref.

6-73. **Some Observations of Stress-Corrosion Cracking in Austenitic Stainless Alloys.** M. A. Scheil. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 22, Nov. '44, 16 pp.

Austenitic stainless alloys are susceptible to stress-corrosion cracking which may occur under certain environments irrespective of their susceptibility to intergranular corrosion. Stressed specimens of stainless alloys included in a corrosion testing program will aid in determining the acceptability of these fabricated alloys, when stressed, to the service conditions. 5 ref.

6-74. **The Susceptibility of Austenitic Stainless Steels to Stress-Corrosion Cracking.** Russell Franks, W. O. Binder and Charles M. Brown. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 23, Nov. '44, 10 pp.

Corroding media examined from the standpoint of promoting susceptibility to stress-corrosion cracking in the annealed and cold-rolled austenitic chromium-nickel steels; only a few of the corrodents have been found to cause this type of failure. The corrosive media that most readily produce stress-corrosion cracking are listed. 4 ref.

6-75. **Stress-Corrosion Tests of Bridge-Cable Wire.** R. E. Pollard. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 25, Nov. '44, 16 pp.

Static stress-corrosion tests on samples of cold-drawn Portsmouth bridge-cable wire and on a few samples of heat-treated Mt. Hope bridge-cable wire and the cold-drawn wire used in the replacement cables of the Mt. Hope bridge. 11 ref.

6-76. **A Study of the Surface Film on Chromium-Nickel (18-8) Stainless Steel.** W. H. J. Vernon, F. Wormwell, and T. J. Nurse. Iron & Steel Institute, advance copy, Oct. '44, 12 pp.

Thickness of the film as measured by total oxides present (Cr_2O_3, Fe_2O_3, NiO) increases with the degree of polish. There is a marked enrichment of chromium in the film as compared with the underlying steel, and this enrichment also increases with the degree of polish. Films from brightly polished specimens contain about 90% of chromic oxide, the balance being mostly ferric oxide. No enrichment of nickel has been observed. The use of chromic oxide as a final polishing material does not appreciably affect the content of chromic oxide in the film. When alumina is used for the final polishing this substance is introduced into the film and the concentration of chromic oxide is simultaneously reduced.

6-77. **Corrosion of Galvanized Coatings and Zinc by Waters Containing Free Carbon Dioxide.** L. Kenworthy and Myriam D. Smith. Institute of Metals *Journal*, v. 70, Oct. '44, pp. 463-489.

Investigation of one of the controlling factors of corrosion of such tanks, namely, the free carbon dioxide content of the water. Increase in free carbon dioxide content increases the attack in all cases. Importance of gas bubbles in initiating pitting in hot tanks discussed. Recommendations are made with regard to the type and thickness of coatings, as well as the treatment of water supplies. 11 ref.

6-78. **Metal Corrosion and Its Prevention.** Raymond R. Rodgers. *Canadian Metals & Metallurgical Industries*, v. 7, Dec. '44, pp. 20-22, 25.

Principal methods of protection and pre-treatment.

7. PROTECTION

7-102. **Lead Coatings on Steel.** Harold A. Knight. *Metals and Alloys*, v. 20, Nov. '44, pp. 1296-1301.

Lead coatings (especially certain specially formulated lead alloy coatings) have often proved superior in their own right and lead coated steel has become of outstanding interest to designers seeking economical, easily workable and corrosion resistant materials for many types of post-war products; describes the coatings (both hot-dipped and electrolytic) and discusses their engineering properties and applications.

7-103. **Decorative Anodizing.** G. O. Taylor. *Canadian Metals and Metallurgical Industries*, v. 7, Nov. '44, pp. 41-42.

Processes developed to apply decorative patterns to anodized aluminum.

7-104. **Clad Steels Provide New Fields for Carbon Steels.** William G. Theisinger. *Canadian Metals and Metallurgical Industries*, v. 7, Nov. '44, p. 49.

Resistance to chemical attack is added when a corrosion resistant metal, such as nickel, is bonded to carbon steels to make clad steels.

7-105. **Protective Resin Films on Cartridge Brass.** H. Gisser. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking, Preprint no. 12, Nov. '44, 9 pp.

Films of phenol formaldehyde, vinylite, cyclid diolefine polymer and nitrocellulose were tested to determine their protective action on cartridge brass against attack by ammonia. Film-continuity studies demonstrated that the phenol formaldehyde films yielded continuous films on cartridge brass at lower film weights than the other materials tested. 10 ref.

7-106. **One-Coat Enameling Steel Is Developed With Exceptional Cold-Drawing Qualities.** *Steel*, v. 115, Dec. 18, '44, pp. 100, 151.

White and other colors of vitreous enamel applied directly to new steel—known as Inland Ti-Namel steel—without the prior application of a base or ground coat enamel; thinner covering of enamel produces a better surface, is less liable to chipping and has longer service life than multi-coat finishes. New alloy and process may result in more extensive use of vitreous enameled steel.

(Continued on Page 7)

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Volume XVIII No. 1

Argues Weldments, Castings & Forgings for Heavy Equipment

Reported by G. G. Luther
Associate Metallurgist, Naval Research Laboratory

The Washington Section of the American Welding Society was host Dec. 13 at the seventh annual joint meeting of that society and the Washington Chapter of the A.S.M. The guest speaker for the evening was Norman L. Mochel, manager, metallurgical engineering, Westinghouse Electric & Mfg. Co., whose theme "Weldments Versus Castings Versus Forgings" was presented from the viewpoint of a specialist whose chief interest was heavy equipment.

Mr. Mochel spoke of the growing feeling of confidence in welding during the war and pointed out that although much progress naturally was made at the expense of casting and forging these latter two methods of fabrication have not suffered in production because of the big job they had to do in the war.

In discussing the black marks against all three fabrication methods, such as flakes and fissures in forgings, defective castings, ship failures and the like, the speaker suggested that a broad viewpoint is needed since all branches are weighted with tremendous production schedules.

Centrifugal line castings were cited as a progressive step which after the war will compete with forging. Electrical machinery frames, long made by casting, will be largely welded structures later on while larger machinery castings will be eliminated in preference to welding. Locomotive beds should continue to be cast due to the quantity required, the speaker said. Ship shaftings of alloy steels have long been a forged product but if cracks are prevalent and are accepted by inspectors, the forging field, Mr. Mochel states, takes a downward step.

Interesting slides were shown of merchant ships, turbines, central stations of power houses, propulsion equipment, condensers and gear rings. The use of all three methods of fabrication in one unit was shown in a large structure in marine service.

The use of precision casting in turbine blades and for other parts was also mentioned as an important step forward.

Buffalo Celebrates Officers' Night

Reported by George F. Kappelt
Assistant Metallurgist, Bell Aircraft Corp.

Approximately 100 members attended the dinner meeting which was held to celebrate National Officers' Night of the Buffalo Chapter in December. At the business meeting following the dinner, National Secretary Bill Eisenman reported on the activities of the Society and its future aims. President Kent R. Van Horn presented his talk on the "Metallurgy of Aluminum Alloys".

Graham Heads Steel Mission to China

Herbert W. Graham, director of research and metallurgy of the Jones and Laughlin Steel Corp., has been appointed to head the steel mission which is a part of a Chinese "War Production Board," to be established by Donald M. Nelson. "Mr. Graham and his associates," says Mr. Nelson, "can design and operate a complete steel mill, and have the resourcefulness to meet the difficult conditions which exist in China."

Sauveur Memorial Committee Report

The following report of the Sauveur Memorial Committee of the American Society for Metals, a special group appointed in 1939 to handle plans and preparations for a "Sauveur Memorial Room" in national headquarters, was submitted on Nov. 24, 1944, by the chairman, H. H. Lester, of Watertown Arsenal, Watertown, Mass.

Other members of the committee are G. B. Waterhouse of Massachusetts Institute of Technology, Cambridge, Mass. (now serving in the Division for Soviet Supply, Foreign Economic Administration, Washington); V. N. Krivobok, International Nickel Co. New York; Joseph Winlock, Edward G. Budd Mfg. Co., Philadelphia; James P. Gill, Vanadium-Alloys Steel Co., Latrobe, Pa.; Bradley Stoughton, Lehigh University, Bethlehem, Pa.; and National Secretary W. H. Eisenman.

The Sauveur Memorial Committee was appointed by the Board of Trustees at a meeting held in Cleveland, August 25, 1939, at which time the idea of setting aside a room in the national headquarters to be known as the "Sauveur Room" was approved. The committee was subsequently authorized to collect funds and did so from individual and chapter contributions. It was expected that a sum of $3500 would be needed. As of Sept. 18, 1941, the sum of $3384 had been collected and it was decided to proceed with the work of planning the arrangements of the Memorial Room even though it was realized that the fund was still short of its goal.

After a period of study it was decided by the committee that the Memorial Room should be dominated by a fine oil painting of Sauveur and should contain various mementoes such as his desk and chair, displays of his diplomas, citations, honor medals, etc. The furnishing and interior decorations were conceived to be of such a nature that the atmosphere of the room would be dignified as befits a memorial room, but cheerful and stimulating. It was considered that the room should be one that could be used by small groups for intimate conferences or for other similar purposes and should by its inspiration contribute to present thinking rather than be merely a monument to past metallurgical achievement.

With this broad concept and through the very fine efforts of Mr. Eisenman a commodious, well-lighted and otherwise suitable room on the third floor of the national headquarters was set aside as the Memorial Room. Through the devoted efforts also of our genial secretary, interior decorators were asked to submit plans and did so, from which was selected a scheme of decorations that seemed to best fit the concept of the committee.

Meanwhile, the committee was busy in selecting an artist to execute the oil painting. After an exhaustive study, Alexander James was selected as the outstanding portrait painter in America best equipped for this commission. Mr. James accepted the commission Feb. 13 and completed the picture about Aug. 1, 1942. The canvas (36 by 26 in.) was delivered to Mrs. Sauveur for the approval of herself and her family. It was indeed gratifying to find that the painting met with the enthusiastic approbation of those most near Professor Sauveur and who could be expected to be most critical. This approval is best exemplified by the words of one of the family who exclaimed, "A miracle has been performed." The picture is still in the custody of Mrs. Sauveur and will not be unveiled for public view until the formal opening of the Memorial Room. Some who have had the privilege of seeing the painting have expressed the opinion that it is a notable contribution to American art.

Professor Sauveur's desk and several chests containing the medals, awards, and other memorabilia have been delivered to the National Headquarters and are being properly safeguarded pending final disposition in the Memorial Room. In addition, Mrs. Sauveur has donated two very fine bronzes, one a bust of Moliere by Coysevox dated 1718, the other a Napoleon, sculptor not indicated. The Coysevox is a museum piece and, no doubt, of considerable value—both will add materially to the decorations.

On Sept. 11, 1942 the treasurer of the committee, Prof. G. B. Waterhouse, transmitted the residue of the funds collected, the total collections less expenses incurred, in the amount of $2866.08 to the society. Financial responsibility was thus transferred and all subsequent expenditures, including payment for the portrait, have been made by the Society.

As indicated above, final plans for the arrangement of the Memorial Room were approved by the committee. These plans were accepted by the Trustees of the society and arrangement made for immediate execution prior to the incidence of the national emergency that was precipitated by the occurrence of Pearl Harbor. This occurrence disrupted plans due to manpower and material shortages. The decision was forced on the committee and particularly upon Mr. Eisenman to suspend activities with regard to the interior decorations until the difficulties with regard to materials and manpower could be resolved. The present status of the project is still that of suspense. Activities to realize the formulated plans will be resumed at the earliest possible time.

Sauveur Memorial Income & Expense
As of Dec. 31, 1944

Income		
Receipts from Collections & Committee		$3,445.09
Expense		
Letters, post cards and postage for circularizing A. S. M. members	$ 592.66	
Portrait of Dr. Sauveur	1,500.00	
Frame for portrait	65.00	
Insurance on portrait	45.00	
Freight and express on memorials	36.17	$2,238.83
Balance on hand		$1,206.26

Respectfully submitted,
H. H. LESTER, Chairman
Nov. 27, 1944 Sauveur Memorial Committee

Two Campbell Lecturers

M. Gensamer

J. B. Austin

James B. Austin, assistant director of the U. S. Steel Corp. Research Laboratory in Kearny, N. J., has been selected to deliver the 1946 Edward de Mille Campbell Memorial Lecture of the American Society for Metals. Dr. Austin, a long-time member of the Research Laboratory staff, has been a prolific contributor to the technical literature, and is the author of "Heat Flow in Metals", a book published by the American Society for Metals.

Maxwell Gensamer, professor of metallurgical engineering at Carnegie Institute of Technology, Pittsburgh, is the Campbell Lecturer for 1945.

Van Horn Speaks at First Meeting Of Eastern New York Under New Name

Reported by A. G. Guy
Research Laboratory, General Electric Co.

The first meeting of the Eastern New York Chapter (formerly the Schenectady Chapter) was highlighted by the presence of Kent R. Van Horn, president of the A.S.M., and William H. Eisenman, national secretary.

A number of ladies in the audience momentarily impeded Bill Eisenman's usual flow of after-dinner pleasantries. However, after explaining the difficulties he and Dr. Van Horn had experienced in attempting to maintain grade-labelled lectures A, B, and C, suitable for audiences of varied distribution in gender, Bill launched into his war-time farming stories to the delight of everyone.

Dr. Van Horn's lecture on "X-Rays in Industry" surveyed the field of application of radiography and X-ray diffraction, with particular emphasis on the reading of radiographic films. A brief presentation of applications of X-ray diffraction methods to metallurgical problems closed the formal talk.

Osborn Explains Induction Heating Theory in Simple Language

Reported by H. H. Hewitt, Jr.
Steel Tank and Pipe Co. of Oregon

Coffee talker at the Nov. 24th meeting of the Oregon Chapter was Charles M. Barbe, radio station KGW news analyst. Mr. Barbe gave a summary of his activities in Europe for the past ten years, which qualified him to speak with definite knowledge on the subject of "What Kind of Peace for Germany".

Program Chairman John E. Comfort then introduced Harry B. Osborn, Jr., research and development engineer for the Ohio Crankshaft Co. of Cleveland, the main speaker of the evening. Dr. Osborn explained the theory of induction heating in simple language and answered all questions readily and with detailed information. In his current lecture tour he has presented his talk before many other A.S.M. chapters.

Metal Literature Review—*Continued*

7. PROTECTION (*Cont.*)

7-107. **Hot Dip Lead Coatings for Steel.** J. L. Bray. *Steel*, v. 115, Dec. 18, '44, pp. 110-112.
Procedure for applying pure lead and the composite coating method used by Continental Steel Corp.

7-108. **Metallizing Non-Conductors.** Samuel Wein. *Metal Finishing*, v. 42, Dec. '44, pp. 736-738.
Rochelle salt process; other silvering processes. 47 ref.

7-109. **Some New Techniques in Protective Coatings.** Carl Bauer. *Industrial Finishing*, v. 21, Dec. '44, pp. 36, 40, 42.
New one-coat finishing; plastic coatings; solventless finishes; hot-application techniques, including hot spraying, hot-melt dipping, flame-spraying; special high temperature curing.

7-110. **Synchronized High-Speed Lines for Steel Strip Provide Continuous Electrotinning.** Wesley F. Hall. *Steel*, v. 115, Dec. 25, '44, pp. 99-100, 121.
Systems handle strip from 14 to 38 in. wide, from 36 to 22 gage, at average speed of 500 ft. per min. Units are designed for automatic control, uninterrupted operation and uniformity of finish.

8. ELECTROPLATING

8-92. **New Lead Plating Process. Allen G. Gray.** *Steel*, v. 115, Nov. 27, '44, pp. 78-80, 114, 116, 118, 120.
Based upon commercial production of sulfamic acid; is developed for application of low cost protective coating to steel. 13 ref.

8-93. **Practical Aspects of Hard Chrome Plating.** J. L. Vaughan and I. A. Usher. *Canadian Metals and Metallurgical Industries*, v. 7, Nov. '44, pp. 20-30, 53.
Data useful to the designer, plater and machinist; plating department; equipment and processes; handling and routine of work; racking; applications and results.

8-94. **Bright Alloy Plate.** *Products Finishing*, v. 9, Dec. 44, p. 34.
Coating consists of an alloy of copper, tin and zinc. Alloy anodes of the same composition as the deposit have been perfected. Metal concentration of the bath maintained automatically. Parts emerge from the solution bright and are blue-white in color.

8-95. **Porous Chromium Plating Piston Rings.** Tracy C. Jarrett and Robert D. Guerke. *Products Finishing*, v. 9, Dec. '44, pp. 36-38, 40, 42.
Details and application of the van der Horst process of porous chromium plating to piston rings. Advantages are wear resisting qualities and longer service and reduction in the wear of the cylinder bores.

8-96. **Wetting Agents—Their Use in Electroplating and Allied Processes.** H. Silman. *Metallurgia*, v. 30, Oct. '44, pp. 321-326.
Use of wetting agents has increased in recent years and further advances are likely as the properties and limitations of these materials become more fully known.

8-97. **Evaluation of Strip Plating Solutions.** *Steel*, v. 115, Dec. 18, '44, pp. 102, 104.
Laboratory plating cell employing a rotating cathode determines the operating characteristics of plating solutions. Unit serves as a means for predicting the results to be expected in commercial strip plating installations. Its construction, operation and applications are presented in detail.

8-98. **Increased Piston Ring Life by Porous Chromium Plating.** Tracy C. Jarrett and Robert D. Guerke. *Metal Finishing*, v. 42, Dec. '44, pp. 732-735.
H. van der Horst porous chromium plating process produces porous chromium wearing surfaces which resist wear. The porous chromium plate applied to piston rings is different from the usual bright plate. It is applied to the cylinder contacting surface of the piston ring and permits the ring to seat itself quickly, without wearing out.

8-99. **The Chemistry of Some Common Bases.** Samuel Gladstone. *Monthly Review*, v. 31, Dec. '44, pp. 1133-1136.
Bases in electroplating; sodium and potassium hyroxides; manufacture; preparation and properties of lime; preparation and properties of ammonia.

10. ANALYSIS

10-65. **Carbon and Sulphur Determinators.** *Steel*, v. 115, Nov. 27, '44, p. 93.
Faster, more accurate, and simpler testing system for all steel, iron, non-ferrous metals and coal and coke.

10-66. **Nitrogen.** S. D. Steele. *Iron & Steel*, v. 17, Nov. '44, pp. 669-670.
Determination in mild steel by a semi-micro method.

10-67. **Spectrographic Work in an Engineering Laboratory.** J. Arnott. *Metallurgia*, v. 30, Oct. '44, pp. 300-304.
If the chemical method is long and laborious, the spectrographic method is recommended. Application of this method to solve the difficult day to day problem. 2 ref.

10-68. **The Application of Diffusion to Micro-Analysis.** G. H. Wyatt. *Metallurgia*, v. 30, Oct. '44, pp. 329-332.
Attention to the proper design of apparatus has made possible accurate quantitative diffusion analysis with minute amounts of evolved gases.

10-69. **Investigations on the Influence of Sampling on the Nitrogen Content of Unalloyed Steels.** H. Kempf and A. Neuberger. *Archiv für das Eisenhüttenwesen*, v. 17, July-August '43, pp. 5-9. Abstract Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 164-A.
It is known that steel when heated will take up nitrogen. Thus, steel at the surface of machined specimens, where it has been heated by friction, has been found to be considerably higher in nitrogen than samples from below the surface. This paper reports on investigations of the nitrogen content of basic bessemer mild steel, basic bessemer rail steel and open-hearth steel, the samples being taken from many different positions in billets and rails. The results proved that, in the drilling of samples, temperatures up to about 300° C. made practically no difference to the amount of nitrogen determined. The results were also the same whether coarse or fine drillings were used.

10-70. **Determination of Tin in Non-Ferrous Metals by Distillation as Bromide and Precipitation with Cupferron.** William D. Mogerman. *Journal of Research*, v. 33, Oct. '44, pp. 307-314.
Gravimetric method for the determination of tin in copper-base and lead-base alloys. Procedure involves separation of the tin by distillation, precipitation with cupferron, and ignition to stannic acid. Results obtained by applying the method to known amounts of tin and to a number of non-ferrous alloys, show that an accuracy to 0.2 mg can be expected for amounts of tin ranging from 0.05 to 0.24 g. 11 ref.

10-71. **Spectrograph Speeds Analysis Work in New Allis-Chalmers Laboratory.** G. W. Birdsall. *Steel*, v. 115, Dec. 25, '44, pp. 73, 112, 114.
Use of the spectrograph as a device for quantitative as well as qualitative checks.

11. LABORATORY APPARATUS, INSTRUMENTS

11-125. **Electron Microscopy.** James Hillier. *Canadian Chemistry & Process Industries*, v. 28, Nov. '44, pp. 728-736.
Interpretation and significance of electron micrographs and newly developed techniques of utilizing the electron beam in various types of analysis.

11-126. **Fine-Pitch Spur Gears Checked by Simple Methods.** Charles Bullen. *American Machinist*, v. 88, Dec. 7, '44, pp. 104-105.
Measurement of pitch diameter, tooth thickness and tooth depth.

11-127. **Electron Microscopy.** Igor B. Benson. *General Electric Review*, v. 47, Dec. '44, pp. 6-14.
Progress in electrostatic art. Fundamentals and operating theory. Essential parts of electron microscope designs that simplify its use. 14 ref.

11-128. **The Microscope.** *Automobile Engineer*, v. 34, Nov. '44, pp. 475-482.
Application to metallurgical investigation.

11-129. **Electronic Aids to Research.** John Markus. *Scientific American*, v. 172, Jan. '45, pp. 19-21.
Pure and applied research alike find a multitude of uses for the electronic tube. From the laboratory to the workbench, electronics is making possible new accuracy in measurement and control. A survey of the field indicates virtually unlimited possibilities for applications of electronic tools.

12. TESTING, INSPECTION AND RADIOGRAPHY

12-303. **Fluoroscopic Tests.** *Aircraft Production*, v. 6, Nov. '44, pp. 511-512.
Examination of light-alloy castings.

12-304. **X-ray Diffraction—An Industrial Tool.** J. S. Buhler. *Metals and Alloys*, v. 20, Nov. '44, pp. 1316-1318.
Describes the equipment and discusses industrial applications.

12-305. **Flaw Detection by Paint and Heat.** Harris P. Moyer. *Metal Progress*, v. 46, Dec. '44, pp. 1274-1275.
Detecting flaws in metal by painting the surface of a metal part with thermal indicating paint and then heating the back. Internal flaws affect the heat flow and are indicated by the paint.

12-306. **The Technical Quality Control of Aircraft Parts by Radiography.** J. F. Turbeville. *Western Metals*, v. 2, Nov. '44, pp. 72-74.
Defects reported on the X-ray report form, together with a code number indicating their magnitude.

12-307. **Service Failure of Forging Die Shanks.** John Vanas. *Steel Processing*, v. 30, Nov. '44, pp. 718-720.
Elimination of fatigue-producing stresses; stress dissipated.

12-308. **Fracture Type, Microstructure and Strength Properties of Some Aluminum Die-Cast Test Bars.** James Erickson. *Light Metal Age*, v. 2, Nov. '44, pp. 24-25, 28.
Presence of inescapable air in the die cavity, during casting, tends to lower physical properties. Improved methods of air escape will result in increased physical properties. A modified structure is retarded when high silicon aluminum alloys are used.

12-309. **The Effect of Long Annealing at Low Temperature on the Elastic Limit of Low-Carbon Steel.** A. Pomp and A. Eichinger. *Mitteilungen aus dem Kaiser-Wilhelm-Institut für Eisenforschung*, v. 26, no. 4, '43, pp. 51-58. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 159-A.
An investigation described, the object of which was to determine how storing at room temperature and long-time annealing at 200° C. affected the appearance of Lüders lines when specimens of low carbon steel, quenched in water from 700° C., were subjected to tensile tests. Seven steels containing from 0.02 to 0.20% of carbon were tested. Normally annealed steel after treatment at 200° C. for 2000 hr. had a clearly defined elastic limit accompanied by Lüders lines. Quenching in water from 700° C. caused the complete disappearance of the plastic range and at the same time increased the deformation resistance. Annealing at 200° C. for only 10 hr. caused specimens tested at room temperature to exhibit a definite elastic limit accompanied by very fine Lüders lines. The difference between the elastic limits of the water-quenched normally annealed steel with and without treatment at 200° C. for 2000 hr. was in some cases quite small, although their lattice constants differed considerably. Increasing the annealing time at 200° C. caused the width of the Lüders bands to increase, but, even after 2000 hr. treatment, they were narrower than those on the normally-annealed specimens.

12-310. **Fatigue Strength of Crankshafts of Large Diesels.** E. Lehr and F. Ruef. *MTZ Motortechnische Zeitschrift*, v. 5, no. 11/12, Dec. '43, pp. 349-357. *Engineers' Digest*, v. 1, Nov. '44, pp. 659-662.
Cyclic torsional fatigue strength with special attention to the influence of flaws of the kind revealed by the magnaflux method.

(Continued on Page 8)

Metal Literature Review

12. TESTING AND INSPECTION (*Cont.*)

12-311. **The Effect of Specimen Shape on the Elongation in Tensile Testing.** G. Malmberg. *Jernkontorets Annaler*, v. 128, no. 6, '44, pp. 197-245. (In Swedish.) Abstract Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 160-A.

An investigation of the effects of changes in the length and section of tensile test specimens is described. The elongation at fracture of cylindrical specimens is independent of the diameter provided that the ratio of the gage length to the diameter remains constant. With rectangular specimens having a constant width to thickness ratio the elongation decreases with increasing area of the cross-section. With a constant cross-sectional area the elongation remains practically constant provided that the width to thickness ratio does not exceed three. When this ratio increases above three the elongation increases, especially with short gage lengths. When necking occurs the resulting non-uniform elongation extends along the whole specimen until it meets the restrictive influence of the specimen heads; it is therefore not possible to calculate the elongation on an arbitrary length when the elongations of the gage lengths are known. Increasing the strain rate decreases the elongation. A very slight irregularity of the gage-length surface lowers the elongation considerably. The restrictive effect of the specimen heads on the elongation extends for 1.5 to 3 times the diameter of the head, a fact which must be borne in mind when acceptance test conditions are changed from a high length to diameter ratio to a low one. A reduction in length takes place at the moment of fracture; this contraction is greatest near the specimen heads and increases with increasing tensile strength.

12-312. **Modern Hardness Testing Machines.** K. Meyer. *Fertigungstechnik*, v. 1944, no. 2, Feb. '44, pp. 47-51. *Engineers' Digest*, v. 1, Nov. '44, pp. 671-673.

Optical hardness testers with integral microscope. Brivisor 3000.

12-313. **Machine for Synchronized, Combined Bending and Torsional Fatigue Tests.** E. Bruder. *Zeitschrift des VDI*, v. 87, no. 5/6, Feb. 6, '43, p. 82. *Engineers' Digest*, v. 1, Nov. '44, p. 678.

Testing machine which allows synchronized loading in both bending and torsion in conformity with actual conditions.

12-314. **The Phenomenon of Metal Fatigue.** *La Technique Moderne*, v. 35, nos. 23 and 24, Dec. 1 and 15, '43, pp. 189-190. *Engineers' Digest*, v. 1, Nov. '44, p. 685.

Fatigue limit of metals depends upon the composition of the metal itself, its heat treatment, the kind of stress to which it is subjected, the magnitude of the superimposed static stress, the internal stress distribution in the piece.

12-315. **The Effect of a Coating of Polybutene on the Fatigue Properties of Lead Alloys.** Lawrence Ferguson and George M. Bouton. American Society for Testing Materials and American Institute of Mining and Metallurgical Engineers, Symposium on Stress-Corrosion Cracking. Preprint no. 27, Nov. '44, 10 pp.

Data which show the effect of coatings of a number of different materials on the fatigue life of four lead alloys. Coating material must be in fluid form wetting a fatigue specimen in order to have an effect. Theory of the mechanism of the action of effective coatings is given. 2 ref.

12-316. **Metal Inspection Plays Important Role in Wartime Maintenance Program.** *National Petroleum News*, v. 36, Dec. 6, '44, pp. R-863, R-866-R-867.

Periodic metal inspection of refinery equipment installed in the wartime program as it was necessary for the designer to use substitute steels and other metals for grades normally used. Experience lacking as to how these materials will stand up in actual practice.

12-317. **Setting Tolerances Scientifically.** William B. Rice. *Mechanical Engineering*, v. 66, Dec. '44, pp. 801-803.

Producing usable articles economically; set tolerances that can be met; quality an economic problem.

12-318. **Cheap High-Duty Steels.** J. Edmiston. *Metallurgia*, v. 30, Oct. '44, pp. 304-305.

As a result of experience under wartime conditions, the future trend in steelmaking may be production to physical properties, rather than to chemical specification, and attention given to possibilities and limitations of most economical types of alloy. "Residuals" in war scrap can be used with advantage in the production of high duty alloy steels economically.

12-319. **The Place of X-Ray Equipment in Industry.** John L. Bach. *Machinery*, v. 51, Dec. '44, pp. 174-177.

Applications of recently developed X-ray inspection equipment in the mechanical industries.

12-320. **Investigations on the Heat of Friction and the Temperature Changes during Wear Tests.** E. Siebel & R. Kobitzsch. *Mitteilungen aus dem Kaiser-Wilhelm-Institut für Eisenforschung*, v. 26, no. 7, '43, pp. 97-106. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 162-A.

In the first part of the paper equations are derived for calculating the heat developed by the friction of two surfaces in sliding contact. In the second part dry wear tests are described in which the temperature distribution was determined when specimens of copper, zinc and bakelite were pressed against a revolving steel ring. Rubbing speeds of over 3 m. per second and pressures exceeding 100 kg. per sq. cm. were used. In the copper-to-steel test the temperature steadily increased during the whole test period of 16 sec. With zinc and with bakelite maximum temperatures were reached and maintained for the remainder of the test. This was due in the case of zinc to the formation of a liquid phase, and in the case of bakelite to decomposition. Temperature measurements showed that these phenomena were confined to thin surface layers. When these stages were reached no further wear in the steel took place.

Seasholtz Gives Heat Treating Lecture Course in Seattle

Reported by Ralph Winship
Columbia Steel Co.

A tremendously successful educational lecture series on "Principles of Heat Treatment" was given by A. P. Seasholtz, metallurgical engineer of E. F. Houghton & Co., in Seattle on Nov. 20, 21 and 22. This was the first opportunity given the steel-minded layman of Seattle to attend a series of lectures on heat treatment, and the response, both of the A.S.M. membership and the public, was extremely gratifying.

The Puget Sound Chapter held its regular monthly meeting on Nov. 17, and Mr. Seasholtz then gave an interesting discussion on salt bath heat treating before a crowded dinner session.

Men responsible for the highly successful heat treating school sponsored by the Puget Sound Chapter in November are (seated, left to right): A. P. Seasholtz, who gave the lectures, and Merle B. Sell, Chapter chairman; back row, standing: Ralph Winship, Chapter secretary-treasurer; C. R. Jackson, chairman of the Educational Committee; and Charles Metzger, vice-chairman of the Chapter.

Highlights of topics discussed during the lecture course were principles of heat treating, application of hardenability data, interpretation of S-curves, and application of the salt bath to austempering, martempering, carburizing and heat treating of high speed steels.

Approximately 300 men—and a scattering of women—attended the first lecture session on Monday, Nov. 20, and an extremely high degree of interest was maintained throughout the meetings. The enthusiasm shown by the steel folk of Seattle is attested by Mr. Seasholtz's statement that the lecture group "away out here in the Pacific Northwest" was the largest that he has addressed in the country.

Clad Steels Described by Theisinger

(*Continued from page* 1)

aration of the clad steel pack and subsequent bonding of the clad metal to the steel backing plate by rolling on the Lukens' 206-in. mill—the world's largest plate mill. The film also showed the forming and fluing of a clad steel head in Lukens' flanging department. Both the head and plate pictured in the film are made from 3-in. thick steel, and are among the heaviest ever produced.

Chairman H. T. Hamon presided and during the dinner introduced Wm. Mackay, first chairman of the British Columbia Chapter A.S.M., and J. L. Balleny, secretary, Ontario Chapter.

New Alloy Steel for Vitreous Enameling

(*Continued from page* 1)

lines regardless of lapsed time from production by the mill to fabrication by the manufacturer. The new alloy steel, therefore, requires neither special temper rolling nor roller leveling to prevent strain lines. It has superior resistance to sagging which means that enameled ware truer to required shape can be obtained or lighter gages can be used.

Metal Literature Review

12. TESTING & INSPECTION (*cont.*)

12-321. Creep Phenomena in Steel at Room Temperature. A. Pomp and A. Krisch. *Mitteilungen aus dem Kaiser-Wilhelm-Institut für Eisenforschung*, v. 26, no. 5, '43, pp. 59-69. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 163-A.

The results of room temperature creep tests on six unalloyed steels, three chromium-nickel-molybdenum steels, a 14.8% chromium steel and an 18-8 chromium-nickel steel are reported. With one of the unalloyed steels the creep fell to zero within 5 hr. (as far as could be ascertained with the apparatus used), but with the other unalloyed steels and one austenitic steel creep continued after several hundred hours. In some cases creep continued right up to fracture.

12-322. Endurance Strength of Screw Threads at Different Temperatures and the Influence of Surface Compression Upon It. Werner Bertram. *Mitt Wohler-Inst.-Braunschweig*, no. 37, '40, pp. 1-52; *Chem. Zentr.*, II, '41, pp. 2488-9. *Alloy Metals Review*, v. 3, Sept. '44, p. 1.

With equal plastic deformation of the threaded section the surface compression increases in proportion to the notch sensitivity of the material. For threads of a given measurement, the most favorable deformation is the same for all materials. By cold deformation of the surface layer, the fatigue strength, even at high temperatures, is greatly increased. On 1⅛-in. threads of steel containing 0.22% C, 0.99% Cr, 0.05% V, 0.90% Mo and of steel containing 0.26% C, 1.29% Cr, 1.33% Mo, an increase in endurance strength of 60 to 80% is obtained by surface compression at 300°, 30% at 500° and 10 to 15% at 600°.

12-323. A Case for the Qualitative Inspection of Surface Finish. H. Peter Jost. *Machinery* (London), v. 65, Nov. 2, '44. pp. 483-486.

Whether the methods that prove effective in the laboratory are to be recommended in workshop practice.

12-324. Influence of Rate of Strain and Temperature on Yield Stresses of Mild Steel. M. J. Manjoine. *Journal of Applied Mechanics*, v. 11, Dec. '44, pp. A-211-A-218.

Tensile tests are reported for room temperature, 200, 400, and 600° C, at rates of strain which vary from 10^{-6} to 10^{3} per sec. The results plotted to show more clearly the effects of strain-aging on the yield stresses and ultimate stress. The comparison of the yield stress at various strain rates permits an analysis of the influence of strain. Conditions necessary for discontinuous yielding described and compared with test experiences. 13 ref.

12-325. Predicting Ultimate Failure Loads. Leon Beskin. *Machine Design*, v. 16, Dec. '44, pp. 117-124.

Margin of safety against failure by fracture depends upon the plastic behavior of material rather than the elastic action commonly assumed in calculating working stresses. Author develops equations and charts for predicting the ultimate failure loads of parts subjected to bending and to eccentric loading.

12-326. Selecting Steel on the Basis of Hardenability. A. L. Boegehold. *Machine Design*, v. 16, Dec. '44, pp. 125-130.

Hardness-cooling-rate patterns.

12-327. Radiographs—What They Tell Designers. Leslie W. Ball. *Machine Design*, v. 16. Dec. '44. pp. 135-140.

Radiography used for reduction of service failures and wasted machining costs must achieve these objectives in a more reasonable and economical way.

12-328. Vibration and Noise—Causes and Cures. Colin Carmichael. *Machine Design*, v. 16, Dec. '44, pp. 141-146, 200, 202.

Torsional vibration. 7 ref.

12-329. Selecting Surface Quality for Machined Parts. James A. Broadston. *Machine Design*, v. 16, Dec. '44, pp. 165-168.

Data sheet for the guidance of designers in selecting and specifying roughness numbers for satisfactory performance with minimum cost.

12-330. What's Ahead in Inspection. *American Machinist*, v. 88, Dec. 21, '44, pp. 91-98.

Proper inspection will reduce scrap losses; fixed solid gages improved upon; gaging elements combined to make useful tools; air gages speed rifle barrel inspection; optics used in inspection devices; much special equipment developed for war production; complicated electric gages check many dimensions; surface inspection gains in importance; inspection machines perform tedious jobs; what is ahead in inspection; tolerances to be chosen more wisely.

12-331. Development and Testing of Triaxial Tension Specimens. *Welding Journal*, v. 23, Dec. '44, pp. 642-S-647-S.

Method for Producing Triaxial Tension, by Michael J. Manioine. A Method of Producing a State of Hydrostatic Tensile Stress in the Interior of Test Pieces, by M. Hetenyi. Cylinder With Axial Pressure Slot in Wall, by L. E. Grinter. Triaxial Tension Test Specimen, by H. C. Boardman. A Suggested Triaxial Specimen, by A. P. Young. Specimens for Triaxial Stress Tests, by Joseph Marin.

12-332. Concerning the Term "Strengthening". W. Spath. *Metall-Wirtschaft*, v. 22, nos. 30-32, Sept. 20, '43, pp. 434-436.

The term "strength" is often used in describing two different properties of materials; namely, strength and hardness. The conception of these two properties is more sharply defined through an analysis of static and dynamic stress-strain diagrams.

12-333. A Note on the Physical Properties of an Austenitic Weld-Metal and Its Structural Transformation on Straining. K. Winterton. Iron and Steel Institute, Advance Copy, Nov. '44, 5 pp.

Mechanical tests at elevated temperatures on composite 18-8 weld-plate tensile specimens, showed that tensile strength, yield strength and hardness declined with increased testing temperatures. Elongation was at a maximum when testing at 250° C. Effect of prior heat treatment at 850° C. in causing increased tensile strength and decreased yield strength decreased with testing temperature and was not apparent above 150° C. Microscopic examination showed a breakdown of dendritic regions to a light-etching alpha-constituent, and the formation of lines and blocks of a deep-etching alpha-constituent, probably due to uneven straining. 3 ref.

Metal Literature Review

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-42. Three-Zoned Temperature Control on a Continuous Furnace. B. M. Putich. *Iron & Steel Engineer*, v. 21, Nov. '44, pp. 35-43.
Automatic temperature control applied to all three zones of a continuous heating furnace gives more production, better quality and higher efficiency.

13-43. Steelworks Pyrometry. A. Linford. *Iron & Steel*, v. 17, Nov. '44, pp. 671-675.
Principles and applications of radiation and optical instruments.

13-44. Thermocouple Method for the Measurement of Liquid Steel Casting-Stream Temperatures. D. A. Oliver, and T. Land. Paper for the Iron & Steel Institute, London. *Engineers' Digest*, v. 1, Nov. '44, pp. 667-668.
"Temperature ring" of arc-furnace electrode graphite. Thermocouple protected by a silica tube, which projected about one inch from the graphite in the narrow part of the funnel.

13-45. High Temperature Measurements of Liquid Steels Using the Quick-Immersion Thermocouple Technique. R. W. S. Freeman. *Canadian Metals & Metallurgical Industries*, v. 7, Dec. '44, pp. 23-25.
Construction of equipment. Application of the method developed by Schofield and Grace for the measurement of high temperatures in liquids.

14. FOUNDRY PRACTICE AND APPLIANCES

14-384. The Production of Aluminium Gravity Die Castings. John Vickers. *Machinery* (London), v. 65, Oct. 26, '44, pp. 469-472.
Melting plant; duplexing system adopted; chalk test.

14-385. Influence of Melting Conditions on Steel Castings. H. T. Protheroe. *Engineering*, v. 158, Nov. 3, '44, pp. 358-360.
Factors which during the various steps in the production of a steel casting, had the most decided influence on the mechanical properties of the final product.

14-386. The Mechanized Production of Aluminum Gravity Die-Castings for the Merline Engine. John Vickers. *Foundry Trade Journal*, v. 74, Nov. 9, '44, pp. 193-199.
Advantages of gravity die casting over sand castings.

14-387. The Side Feeding of Steel Castings. B. Gray. *Foundry Trade Journal*, v. 74, Nov. 9, '44, pp. 201-204.
A note on the influence of the mechanism of freezing. 4 ref.

14-388. Centrifugal Casting of Aircraft Engine Cylinder Liners. *Machinery* (London), v. 65, Nov. 9, '44, pp. 505-511.
Development of process; construction of spinning mold.

14-389. Unique Centrifugal Steel Casting Method. Gerald E. Stedman. *Metals and Alloys*, v. 20, Nov. '44, pp. 1311-1315.
Technique for centrifugally casting steel sheaves and other parts described, is one of the fastest yet developed and should be of wide interest to foundry engineers.

14-390. What Will Decide Postwar Buying of Castings? R. V. Elms. *Aluminum and Magnesium*, v. 1, Nov. '44, pp. 16-17, 32.
Foundry must be prepared to take full advantage of technical improvements and adequate inspection to insure that quality control is effective.

14-391. Magnesium Castings for High Pressure Service. W. O. Wetmore and T. W. F. Foster. *Aluminum and Magnesium*, v. 1, Nov. '44, pp. 18-19, 43.
Purpose of tests reported was to prove that magnesium castings free of any porosity are capable of withstanding relatively high internal hydraulic pressures.

14-392. The Development and Production of Inoculated Cast Iron. H. P. Hughes and W. Spenceley. *Engineering*, v. 158, Nov. 10, '44, pp. 378-380.
Production of inoculated cast iron, developed to replace ordinary cast iron.

14-393. Metallurgy in the Non-Ferrous Foundry. A. C. Boak. *Canadian Metals and Metallurgical Industries*, v. 7, Nov. '44, pp. 31-33.
Gates and risers; bottom gating; pouring temperatures; hottest metal in riser; top pouring of castings; sand wash; modified bottom pouring; application of top pouring; horizontal casting.

14-394. Quality Control in the Aluminum Foundry. Roland T. Kinney. *Western Metals*, v. 2, Nov. '44, pp. 32, 37-38.
Yield strength is undoubtedly more important than tensile strength, and parts should be designed to stay below the stress where permanent deformation begins.

14-395. Postwar Aluminum Castings. Frank E. Gaines. *Western Metals*, v. 2, Nov. '44, pp. 58, 61.
Factors in favor of building up an aluminum casting market.

14-396. Gravity Die Casting of Aluminum Alloys. A. Vath. *Light Metal Age*, v. 2, Nov. '44, pp. 14-19.
Nature of gravity die-casting, conditions for its application, and design of castings. The design of molds; the properties of various alloys, as well as choice of alloys.

14-397. Future Outlook in the Aluminum Foundry Industry. E. Carrington. *Light Metals*, v. 7, Nov. '44, pp. 515-518.
Effect of wartime technical developments on the postwar consumer field for aluminum castings. Aspects of the secondary metal market examined; possible new fields of use suggested.

14-398. Founding of Magnesium Alloys. *Light Metals*, v. 7, Nov. '44, pp. 560-562.
Casting of the ultra-light alloys. Importance of a fundamental knowledge of magnesium chemistry and physics is emphasized.

X-Ray Applications Run From Small Parts To Over 8 In. of Steel

Reported by J. Royer
Welding & Supplies Co., Ltd.

The Dec. 4th meeting of the Montreal Chapter opened with two interesting sound films by the Canadian General Electric Co., Ltd.: "Sightseeing at Home" gave a preview of television, and "Excursions in Science" illustrated a few of the phenomena made possible by modern materials and apparatus.

The technical session consisted of a discussion of "X-Ray in Industry," by E. Dale Trout, of the General Electric X-Ray Corp. Until 1928, Mr. Trout pointed out, X-rays were practically confined to the medical field. Other uses developed slowly until the beginning of the war, and from them on expanded tremendously.

One of the first industrial applications of X-ray was the examination of welds in high pressure vessels and pipe. X-ray clearly shows up slag inclusions, poor penetration, and gas pockets. In the construction of Boulder Dam, 96 miles of joints were so examined.

In the foundry, examination of castings by X-ray not only insures sound castings, but also saves costly machining operations on defective castings.

Two Million Volt Equipment Developed

The examination of heavy crankshafts and similar large parts necessitated building X-ray voltages up to one million volts; with this high voltage, it requires 1½ hr. exposure to penetrate 8 in. of steel. The recent demand for the radiography of even greater thicknesses of metal has led to the development and manufacture of two million volt equipment.

Mass X-ray examination of whole trays of aircraft parts is now possible; where high sensitivity is not required, fluoroscopic examination is used.

Mr. Trout briefly discussed such factors as voltage, time of exposure, and sensitivity. The absorption of X-ray by any material increases with the density and thickness of the material, so that as denser and thicker objects are examined, higher voltages are required. To date, as high as 100 million volts have been experimented with, but most equipment ranges from 100,000 to 2,000,000 volts. There are some special applications, however, such as the radiography of spot welds in aluminum where voltages as low as 5000 to 10,000 are in use.

Another use of high voltages is for examining assemblies containing constituents of different densities, such as differential valves.

Sensitivity is the ratio of the smallest depth of discontinuity that will show on the film to the total thickness of the part; it is measured by so-called penetrometers, which are a series of shims of different thicknesses laid side by side on top of the part to be examined. Required sensitivity is usually 3% for magnesium and 2% for aluminum and steel.

Metal Literature Review

14. FOUNDRY PRACTICE AND APPLIANCES (*Cont.*)

14-399. Redesigning a Foundry for Maximum Efficiency. R. W. Bierwagen. *Foundry*, v. 72, Dec. '44, pp. 74-78, 106.
Produce straight line flow of the materials going into the founding of castings. Provide mass production facilities adaptable to jobbing orders. Provide necessary control facilities for maintaining a uniform product and a reduction in defective castings.

14-400. Selecting Inhibitors for Magnesium Molding Sand. L. W. Eastwood. *Foundry*, v. 72, Dec. '44, pp. 82-83, 232, 234
Various types of reactions which occur when molten magnesium enters a sand mold, and methods of correcting them, are discussed in this first of two articles.

14-401. Plant Layout for High Frequency Melting. George F. Applegate. *Foundry*, v. 72, Dec. '44, pp. 84-86, 202, 204, 206.
By combining up-to-date material handling techniques, plant layout, and high frequency melting, numerous modern alloy steel and non-ferrous metal foundries are achieving cleanliness, comfort, and smooth-flowing production of uniform, clean, precise-composition castings with low metal loss.

14-402. Patterns for Magnesium Castings. Harry J. Jacobson. *Foundry*, v. 72, Dec. '44, pp. 87, 192, 196.
Basic factor in successful production of quality magnesium castings is the pattern.

14-403. Improvements in Pressure Ferrous Castings Influencing Their Future Use. E. C. Jeter. *American Foundryman*, v. 6, Dec. '44, pp. 5-10.
Development and improvements in the centrifugal casting field. History of the process and discusses current applications to offer clues to the future trend of centrifugally cast parts. 6 ref.

14-404. Foundation of Sand Rammer. *American Foundryman*, v. 6, Dec. '44, pp. 11-16.
Various methods of supporting the A.F.A. standard sand rammer were examined to find their effects on sand strength and permeability. Shock absorbing supports were unsatisfactory. Several acceptable methods described.

14-405. Centrifugal Castings. Peter Blackwood and John Perkins. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 273-312.
Types of centrifugal castings classified into three groups: (1) Die molds, (2) Semi-centrifugal—center pour, (3) True centrifugal—Cylindrical shapes, the inside diameter of which is governed by the volume of metal poured. The authors have classified them into following groups: (1) Dry sand spinning, (2) Die mold spinning, (3) Green sand spinning.

14-406. Centrifugal Casting of Steel. C. K. Donoho. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 313-332.
Various methods and types of centrifugal casting of steel. Advantages and disadvantages of centrifugal casting, as evaluated by comparison with static casting and forging. Physical properties of steel cast centrifugally under various treatments on the structure and properties of centrifugally cast steel discussed. 8 ref.

14-407. Precision Casting by the Investment Molding Process. Robert Neiman. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 349-383.
Shows how precision casting process by the investment method fills a need for producing accurate castings of an intricate nature. Historical basis given briefly and developed more fully in its dental use which serves as the basis for the precision casting. Physical principles of compensating shrinkages and expansions with the properties of pattern materials, investments, and casting alloys. Information given for producing precision castings from the blueprint stage to the final inspection and gaging. 23 ref.

14-408. Design and Safe Operation of Centrifugal Casting Machines. James G. Weber. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 384-392.
Inherent problems and dangers connected with the process, as well as the wide divergence from the field of static casting.

14-409. Centrifugal Casting of Non-Ferrous Metals. I. E. Cox. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 407-413.
Research approach toward developing a mechanized method of centrifugal casting production.

14-410. Spinning Speeds of Centrifugal Casting Machines. F. G. Carrington. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 333-348.
Spinning speed, or revolutions per unit time, for a centrifugal mold determined by direct effect of centrifugal force together with the force of gravity, the shape of the casting, details of machine design, and metallurgical characteristics. Paper enumerates these factors and their individual effects.

14-411. Some Practical and Economic Aspects of Small Foundry Conveyorization. Howard B. Nye. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 414-420.
When foundry improvements should be made to promote greater efficiency and/or higher production, conveyors are among the first additions suggested. Most frequently posed questions with regard to foundry mechanization.

14-412. Mold Surface Properties at Elevated Temperatures. H. W. Dietert, R. L. Doelman, and R. W. Bennett. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 421-440.
Tests to obtain information concerning the elevated temperature properties of mold surfaces, such as spalling, confined expansion, hot strength, and hot deformation. Data presented graphically.

14-413. Malleable Mixture Calculation and Melting Control. M. E. McKinney. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 441-458.
The choice and proportion of materials in malleable mixtures reduced to a mathematical formula; operation of a powdered coal fired air furnace is controlled by a continuous indicator of exit-gas analysis, coupled with a sensitive gage showing draft or pressure inside the furnace.

(Continued on Page 12)

Miller Uses Heated Wires to Demonstrate Critical Temperatures in Heat Treating Talk

Reported by John R. Dobie
Heat Treat Foreman, American Steel & Wire Co.

R. F. Miller, development engineer, Carnegie-Illinois Steel Corp., spoke to a joint meeting of Worcester A.S.M. and Worcester Engineering Society members on Nov. 8 on "Principles of Heat Treatment."

Starting with the crystalline structure he discussed the iron-carbon diagram and effect of alloy content on steel treatment. A demonstration of the thermal arrest at critical temperature was shown vividly by heated wires. First an austenitic steel was heated in the dark. It gave no indication of change in cooling. Then a carbon steel wire was heated well over the critical and allowed to cool. The reglow was readily apparent to all present.

Having thus shown one effect of crystal rearrangement that occurs at critical temperature, Dr. Miller compared the properties of austenite and alpha iron and showed slides picturing the various conditions in which carbon exists in steel and the resulting changes in properties caused by varying its percentage.

Dr. Miller discussed several S-curve diagrams, showing the effects of alloying elements on the time intervals before the nose of the curves. Effect of grain size was also touched upon.

In a final summation Dr. Miller showed four S-curves depicting, in order, old quench and temper practice, isothermal quenching, martempering, and austempering. He discussed each in the light of the other by showing their relative shortcomings and advantages.

Wade Houk, works metallurgist, American Steel and Wire Co., was acting chairman for the evening. Before introducing Dr. Miller he gave an interesting story of the founding and growth of the American Steel and Wire Co. in Worcester.

Among leaders at the November meeting of Worcester Chapter were, left to right: Wade B. Houk, American Steel & Wire Co., who delivered a history of his company in Worcester and introduced the chief speaker, Richard F. Miller, Carnegie-Illinois Steel Corp., who spoke on "Principles of Heat Treatment"; Rudolph A. Johnson, Wickwire-Spencer Steel Co., Chapter chairman; and Clifton P. Howard, president of the Worcester Engineering Society.

New Aluminum 75S Alloy and 5.25% Zinc Casting Alloy Described

Reported by C. M. Hovey
Superintendent of Testing Laboratory, University of Manitoba

Manitoba Chapter was addressed on Nov. 9 by Paul E. Lamoureux, materials and processes engineer, Trans-Canada Air Lines, Winnipeg, on "The Physical Metallurgy of Aluminum and Its Alloys."

The speaker outlined the number and letter designations of commercial aluminum alloys and described the physical properties of the more common ones. The advantages and disadvantages of the various alloys, both cast and wrought, were discussed with special reference to corrosion resistance. The process of "cladding" as applied to aluminum for protection against corrosion was explained.

Some mention was made of the new high strength wrought aluminum alloys of the 75S type and of the natural aging (5.25% zinc) casting alloys.

The meeting ended with the showing of two films, "Unfinished Rainbows" and "Aluminum, Mine to Metal," furnished through the courtesy of the Aluminum Co. of America.

Focke, A.S.M. Trustee, Speaks In Dayton on Tempering of Steel

Reported by T. E. Hamilton
Metallurgist, Delco Products Div., G. M. C.

December 6 was National Officers' Night in Dayton, opened with a brief talk by A.S.M. National Secretary Bill Eisenman. The speaker of the evening was National Trustee A. E. Focke, research metallurgist for the Diamond Chain & Mfg. Co., who spoke on "Tempering of Steel."

He discussed various phases of tempering and showed a series of three-dimensional diagrams giving the relation between the physical properties of steels of varying carbon and alloy content and the time and temperature of tempering.

Milne Opens Two New Warehouses

Two new warehouses have been opened by A. Milne & Co. to carry a stock of tool steels, drill steels, graphitic steels, and Stressproof steel. The address of the new Pittsburgh warehouse is 1000 Constance St. N.W., while the Pittsburgh office remains at 604 Frick Bldg. In Philadelphia a new warehouse has been established at 337-339 N. Orianna St.; the Philadelphia office, formerly at the Bourse Bldg., has been moved to the warehouse address.

Three Ontario Meetings Cover Brazing, Electric Steel, Fatigue

Reported by G. L. White
Editor, Canadian Metals & Metallurgical Industries

Ontario Chapter A.S.M. held three very successful meetings in October, November and December. At the first of these meetings, on Oct. 6, H. M. Webber, furnace application engineer, General Electric Co., Schenectady, N. Y., spoke on the subject of "Silver and Copper Brazing."

The speaker dealt particularly with electric furnace and induction brazing. After outlining the general principles involved, he went thoroughly into some of the practical problems in production brazing and further illustrated his point by dealing with the methods used and the results obtained in the production of a considerable number of items.

The subject of "Electric Furnace Steel Making" was discussed by E. R. Johnson, chief metallurgical engineer, Republic Steel Corp., Massillon, Ohio, at the meeting on Nov. 3. An additional feature of this meeting was a motion picture "Tools of Today for the Jobs of Tomorrow," shown through the courtesy of A. C. Wickman (Canada) Ltd., Toronto.

At the meeting on Dec. 1 J. O. Almen, mechanical engineering department, General Motors Research Laboratories, Detroit, spoke on a subject for which he is well known to many A.S.M. Chapters—"Fatigue in Relation to Design."

Wartime Developments Lead to Peacetime Uses of Forgings

Reported by J. N. Lynn
Rustless Iron & Steel Corp.

"Forging Wartime Development for Peacetime Use" was presented in a most interesting manner to the Baltimore Chapter by Waldemar Naujoks, chief engineer of Steel Improvement & Forge Co., Cleveland. The introduction, dealing with the early history of forging and its association with warfare, was followed by an account of the development of the forge hammer to its present-day efficiency.

The various parts of a die block were named and the functions of each explained. A number of forging operations were described in detail, as well as horizontal and vertical forging machines and their dies.

The hour-long question and answer period following the talk is a high compliment to the speaker and the interest he created in forging.

Salkover Resigns From Queen City

N. M. Salkover has severed his connection as vice-president and general manager of the Queen City Steel Treating Co. to devote all of his time to further development of Salkover Metal Processing, a concern which he organized in 1941 and which operates modern commercial copper brazing and bright annealing plants in Chicago and Long Island City, N. Y.

Mr. Salkover will continue, however, to make his home in Cincinnati, Ohio, where he has an office in the Dixie Terminal Bldg. He has been vice-president of Queen City Steel Treating Co. for 20 years, and general manager for the past 16 years.

Durex Filters and Bearings Highlight Talk on Metal Powder

Reported by J. Alfred Berger
Research Metallurgist, Molybdenum Corp. of America

"Practical Aspects of Powder Metallurgy" were covered in an exceedingly interesting manner by Roland P. Koehring, chief metallurgist, Moraine Products Division, General Motors Corp., before a recent meeting of the Pittsburgh Chapter.

Mr. Koehring traced the development of the art from its origin, and described the processes for making metal powder. Hard alloys like antimony, bismuth and silicon that are friable are usually powdered in a ball mill. Stamp mills are used for flaky powders (copper and bronzes). Low melting point alloys (Sn, Pb, Zn, Al) are atomized using air as the atomizing fluid. Electrolytic and chemical deposition account for many powders, while an important process produces metal powders (Mo, W, Fe, Co, Cu) by reduction of the metal oxides by hydrogen or other hydrocarbon gases. Pyrophoric metals like magnesium and aluminum are generally made by machining. The Carbonyl process produces very pure spherically shaped particles having an "onion-skin" appearance.

Iron Powder Structure Shown

Mr. Koehring's excellent slides showed photomicrographs of iron powders made by various processes and types of presses employed in shaping the metal part. The diagrammatic sketches proved very readily that metal powders do not flow in the die cell and for that reason design of parts plays an important role in the art.

The high spot of Mr. Koehring's talk was probably his description of Durex filters and powder metal bearing applications. The Moraine Products Division has developed a porous metal filtering material possessing four grades of permeability from spheres of copper-tin particles bonded at the surface of the spheres.

Filter Separates Gasoline and Water

One filter displayed that evening will separate mixtures of gasoline and water. If wet first with water, water passes through and gasoline remains; if first wet with gasoline the water stays behind while gasoline passes through. These filters find many applications as injector filters for diesel engines, in gas pumps and carburetors for airplane engines, in refrigeration devices for removal of mist and water vapors, in diffusing gases in liquids and many others.

Powder metallurgy served as a means to an end in making steel-backed babbitt bearings. A mixture of copper and nickel metal powders is spread evenly on a strip of steel which is sintered in a furnace at 2000°F. The copper bonds the nickel to the steel (modified brazing) and a sandpaper-like surface 0.025 to 0.030 in. thick results. In a vacuum 0.017 in. of babbitt is flowed on the nickel-copper surface and both a mechanical and metallurgical bond results. The bearing is then finished 0.001 to 0.003 in. above the copper-nickel layer and a thin bearing that will withstand high loads and eliminate scoring results. A Kodachrome photomicrograph clearly showed the type of bond that was obtained.

National Officers Greeted in New York; Chapter Congratulated on Activities

Reported by G. A. Landis
E. W. Bliss Co.

On Dec. 11, a large, representative group of the New York Chapter membership welcomed National Officers Kent Van Horn and Bill Eisenman from Cleveland, and Harry McKinney from the neighboring New Jersey Chapter. Secretary Bill brought greetings from the national headquarters, and congratulated the Chapter on its contributions in time and work on the part of its members, including Past President French, Trustee Bergen, and Retiring Trustee Krivobok, whom he presented with the Trustees' Medal. In addition, he announced the selection of present Chapter Chairman J. B. Austin as the Campbell Memorial Lecturer in 1946.

A.S.M. President Van Horn was introduced by Dr. Krivobok, technical chairman for the evening. With the assistance of well-selected "form fitting" slide illustrations, the significant effects of various alloys on the structure and properties of aluminum were excellently presented, in Van Horn's typical concise and straightforward manner.

A.S.M. Review of Current Metal Literature — *Continued*

14. FOUNDRY PRACTICE *(Cont.)*

14-414. **Introductory Observations on the Rate of Solidification of Malleable Iron.** B. C. Yearley, R. P. Schauss and P. A. Martin. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 483-500.

Experiments to determine the freezing rate of malleable iron. When the freezing rate has been accurately determined, it should be possible to predict how any section of a casting may be fed.

14-415. **The Four-Part Cheek Method of Producing Cast Iron Cylinders.** Robert Hendry. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 517-526.

Manufacturing paper machinery in a pre-war era, converted to building marine steam engines, a method of production, combining speed with efficiency, had to be adopted—the 4-part cheek method.

14-416. **Die Casting Aluminum Alloys by the Cold Chamber Process.** S. U. Siena. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 543-551.

Alloys used, details of the process and recommendations to be observed to secure the best possible product. Casting and die design and the factors involved in the process, such as die preheating, die coatings, metal injection speeds and pressures, metal and die temperature control and melting practice.

14-417. **The Mechanized Production of Aluminum Gravity Die-Castings for the Merlin Engine.** John Vickers. *Foundry Trade Journal*, v. 74, Nov. 16, '44, pp. 215-220.

Advantages of gravity die-castings over sand castings.

14-418. **Magnesium Casting Alloys.** *Machine Design*, v. 16, Dec. '44, pp. 169-174.

Properties, characteristics, applications, fabrication, resistance to corrosion, galvanic corrosion.

14-419. **Carbon and Graphite Mold Plugs and Stool Inserts.** V. N. Nolan. *Steel*, v. 115, Dec. 25, '44, pp. 94, 96, 120.

Carbon stool allows metal in mold to retain fluidity for sufficient period for gases to be liberated and thus prevent destruction of stool. Carbon and graphite, because of their physical properties, lend themselves to various metallurgical processes including the production of low and high carbon steels, copper and brass, tungsten carbide tools and cobalt-chromium-tungsten alloys. Carbon mold plugs first used in electric furnace shops for this purpose.

14-420. **The Influence of Centrifugal Casting Upon the Structure and Properties of Steel.** L. Northcott and D. McLean. Iron and Steel Institute, Advance Copy, Nov. '44 .4 pp.

Thick cylinders of a nickel-chromium-molybdenum steel were cast by the centrifugal process using chill molds rotating about a horizontal axis without a central core. The casting conditions were varied with respect to mold speed, casting temperature and rate of pouring, and each casting was examined to determine the influence of these factors upon its structure. Mode of solidification of castings showing the different structures is discussed. 5 ref.

14-421. **Progress in the Method of Pressure Casting and in the Composition of Alloys Adaptable for Such Castings.** E. Lohrke. *Metall-Wirtschaft*, nos. 27-29, August 20, '43, pp. 401-405.

The years of the war have impelled rationalization and mass production in the industry. Pressure casting was one of the methods highly developed in these years. Machines and dies used, composition of alloys adaptable to such methods of castings, and the surface protection of finished castings are described.

14-422. **Patterns and Pattern Equipment.** *Canadian Metals & Metallurgical Industries*, v. 7, Dec. '44, pp. 37-38.

Place of patterns and allied equipment in foundry efficiency, cost and suitability of design for the purpose intended. General types and markings.

15. SECONDARY METALS

15-32. **Centralized Chip and Oil Salvage Pays Substantial Dividends.** Crawford Campbell. *American Machinist*, v. 88, Nov. 23, '44, pp. 94-97.

Treating chip cleaning and reclamation of oils and solvents as bulk-material handling operations. Operating at less than capacity, the chip house built by a Canadian arms manufacturer will pay for itself in two years, besides helping the shop to obtain better product quality.

15-33. **Reclamation of Tin from Tin Cans.** Walton S. Smith. *Metals*, v. 15, Nov. '44, pp. 14-15, 17.

Domestic source; difficulties involved; detinning capacity; steel scrap recovered.

15-34. **Salvaging of Large Cast Iron Castings.** H. O. Quartz. *Iron Age*, v. 154, Nov. 30, '44, pp. 52-56.

Defective castings weighing up to a few hundred pounds are often more economically scrapped than repaired, particularly if they are being turned out in large quantities. Castings weighing up to 100 tons and taking weeks to mold and pour, however, cannot be so readily thrown away if defects appear. With the customer's approval, one of several methods can be employed to salvage many of these large castings. Arc and gas welding as well as "burning" are illustrated.

15-35. **The Utilization of Fired Cartridge Brass in Cast Manganese Bronze.** John T. Robertson. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 527-538.

Fired cartridge brass can be used in the manufacture of low tensile cast manganese bronze with no serious harm to the mechanical properties provided that the antimony content is not more than 0.01%. 5 ref.

15-36. **Baling Sheet Scrap.** G. W. Birdsall. *Steel*, v. 115, Dec. 18, '44, pp. 92-93, 142, 144, 146, 148.

Value of skeleton material from stamping operations is increased by $4 to $6 per ton when loose material is hydraulically compressed into bundles. Any stamping department with more than 5 tons per day of such material can profitably employ hydraulic baling, it is reported. Large baling installations are used by many steel mills to handle their own mill trimmings and sheet scrap.

16. FURNACES AND FUELS

16-160. **Blast Furnaces.** A. J. Jennings. *Iron & Steel*, v. 17, Nov. '44, pp. 676-679.

Centralized lubrication.

16-161. **Heat Exchange.** *Iron & Steel*, v. 17, Nov. '44, pp. 684-685.

"Incandescent" thermobloc recuperator for waste heat recovery.

16-162. **Metal Heating Furnaces.** R. S. van der Spuy. *Journal* of the South African Institution of Engineers, v. 42, Dec. '43, and Jan. '44, pp. 66-89. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 148-A.

Operating metal heating furnaces to the best advantage. The following factors are dealt with: the temperature of the furnace; handling of materials; firing of the furnace; the effect of the size of the charge; heat transmission to the charge; the furnace gases; the effect of furnace construction; and furnace efficiency.

16-163. **Considerations on Blast-Furnace Practice.** T. P. Colclough. Iron & Steel Institute, Advance Copy, Oct. '44, 18 pp.

Considerable economies in coke consumption may be effected in many blast furnaces. To secure these economies it is necessary to attain a higher efficiency in the combustion of the carbon used within the furnace and to reduce as far as possible the weight of the slag-forming oxides charged in the burden.

16-164. **The Aachen Hot Blast Cupola.** E. Piwowarsky. *Die Giesserei*, v. 30, no. 20/22, Oct. '43, pp. 221-225. *Engineers' Digest*, v. 1, Nov. '44, pp. 669-671.

The use of a hot blast offers considerable advantages, uniformity of operation with the slagging of the tuyeres also decreasing.

16-165. **Working a Heat of Acid Electric Steel (Notes for Operators).** Conrad C. Wissmann. *Metal Progress*, v. 46, Dec. '44, pp. 1277-1284.

The cause of the "boil"; how it is started and stopped; the desirable amount of carbon at the end of the boil (as related to the specification for the finished casting); the undesirable "silicon boil"; the danger of over-oxidized or over-reduced baths and how to prevent their occurrences.

16-166. **Pulverized Coal Firing of Malleable Iron Annealing Kilns.** L. S. Wilcoxson and D. F. Sawtelle. American Foundrymen's Association *Transactions*, v. 52. Dec. '44, pp. 552-563.

By direct firing an old hand-fired kiln, followed by the conventional pair of car type periodic kilns fired alternately with one pulverizer; and the more recent installation of a direct-fired circulating system with which any or all of the five kilns can be fired from one pulverizer.

16-167. **Modern Blast Furnace Design and Operation.** James Dale. *Blast Furnace and Steel Plant*, v. 32, Dec. '44, pp. 1451-1456.

Developments of the American type of furnace.

16-168. **Generalization of Blast Furnaces.** Georg Bulle. *Stahl und Eisen*, v. 64, no. 18, May 4, '44, pp. 285-294.

In cooperation with blast furnace constructors and blast furnace metallurgists, a generalized type of blast furnace was developed. Suggestions made for standardization of parts.

16-169. **Applying Industrial Gas in the Metals Field.** H. M. Heyn. *Industrial Gas*, v. 23, Dec. '44, pp. 12-13.

Potential markets.

16-170. **Recent Evolutions in Process Heating with Gas.** Harry W. Smith. *Industrial Gas*, v. 23, Dec. '44, pp. 14-15, 31.

Higher speed heating. New gas-fired heat treating equipment.

16-171. **Basic Principles of Combustion Engineering of Hot-Dip Galvanizing Furnaces, XXIII.** Wallace G. Imhoff. *Industrial Gas*, v. 23, Dec. '44, pp. 16-17, 31-36.

Galvanizing furnaces—gas fired.

17. REFRACTORIES AND FURNACE MATERIALS

17-74. **Economic Thickness of Thermal Insulation for Intermittent Operation.** C. B. Bradley, C. E. Ernst and V. Paschkis. *Industrial Heating*, v. 11, Dec. '44, pp. 2070, 2072, 2074, 2076, 2078, 2080, 2082.

Economic thickness of thermal insulation for intermittent operation, defined as thickness yielding the smallest sum of cost of heat loss and fixed cost of insulation. Method based upon the electrical analogy method.

17-75. **Refractory Practice in Malleable Air Furnaces.** Ray A. Witchey. *Brick & Clay Record*, v. 105, Dec. '44, pp. 29-32, 34, 36.

Choice of refractories is made subject to qualification by operating conditions. Furnace operation is reviewed to clarify reasons for choice of refractories.

18. HEAT TREATMENT

18-256. **Partition of Molybdenum in Steel and Its Relation to Hardenability.** Fred E. Bowman. *Steel*, v. 115, Nov. 27, '44, pp. 82, 84, 86.

During transformation of austenite to pearlite, molybdenum in iron-carbon-molybdenum alloys of approximately eutectoid carbon content segregates in the carbide phase. Necessity for its diffusion during transformation process is indicated.

18-257. **Nitrided Steels.** E. Ineson and C. Petteford. *Iron & Steel*, v. 17, Nov. '44, pp. 699-702.

Process and choice of materials.

18-258. **The S-Curve and Its Significance in the Practical Heat Treatment of Steel.** A. L. Simmons. *Australasian Engineer Science Sheet*, June 1, '44, pp. 2-19. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 152-A.

Shortcomings of the iron-carbon diagram with regard to the practical heat treatment of steel. S-curves are introduced with details of their method of construction, and their relation to cooling curves and hardenability. It is shown how variables such as composition and grain size influence the shape of the S-curves and the modern interpretation of the martensite region described. The continuous-cooling S-curve is dealt with briefly, followed by detailed discussion of various practical treatments (such as spheroidizing, annealing, normalizing, austempering, martempering and hardening) in their relationship to the various regions in the curve.

18-259. **Distortion as a Production Problem.** H. Petzal. *Machine Shop Magazine*, v. 5, June '44, pp. 80-86; July, '44, pp. 72-76. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 154-A.

The causes and cures for distortion in heat treated parts discussed. Normalizing in the initial production stages of rods or blanks is the safest means of forestalling some of the distortion difficulties which originate in non-uniform raw material.

18-260. **Modification by Heat-Treatment of Cast Structures and Properties.** H. T. Angus. *Foundry Trade Journal*, v. 74, Nov. 2, '44, pp. 171-177.

Castings can be heat treated to give reliable mechanical properties. 4 ref.

18-261. **Continuous Annealing of Cartridge Cases.** Clarence A. Maurer. *Metals and Alloys*, v. 20, Nov. '44, pp. 1302-1303.

Adaptation of a continuous convection type tempering furnace to the continuous annealing of brass cartridge cases; furnace design and operating details and the results obtained.

18-262. **Essential Characteristics of Controlled Atmospheres.** W. D. Vint. *Metallurgia*, v. 30, Oct. '44, pp. 293-296.

Demand for greater multiplicity of light steel articles is growing. Necessity for cold-working operations in shaping them, and the rigid physical specifications demanded. Bright annealing as an intermediate stage in production has become a major phase in manufacturing technique. Bright annealing can be carried out in any type of non-oxidizing atmosphere. Essential characteristics of these atmospheres.

18-263. **Sub-Zero Treatment Improves Tool Life of High-Speed Steels.** T. M. Snyder. *American Machinist*, v. 88, Nov. 23, '44, pp. 91-93.

Production checks show that sub-zero temperatures as part of the heat treatment cycle improve performance of high speed steels.

18-264. **Distortion of Aluminum Aircraft Parts During Heat Treating and Quenching.** W. P. Sykes. *Western Metals*, v. 2, Nov. '44, pp. 42, 44-45, 47.

With a slow quench, warping is reduced but precipitation of compounds occurs in larger particle size during age hardening. This reduces the yield point and provides excellent chance for intergranular corrosion. To avoid these defects the part must be heat treated and quickly quenched; major factor contributing to the warping of the part is the type of quench.

18-265. **Sub-Zero Treatment of Steel.** H. C. Amtsberg. *Steel Processing*, v. 30, Nov. '44, pp. 721-725.

Presentation of the fundamentals of cooling hardened steels to temperatures considerably below room temperature properly correlated with the basic treatment cycle and related structural changes. 11 ref.

18-266. **Application of Controlled Atmospheres to Metal Processing.** C. E. Peck. *Steel Processing*, v. 30, Nov. '44, pp. 729-735, 748.

Principal types of atmospheres, and the equipment available for producing these atmospheres. Application of the various atmospheres to a wide variety of heat treating processes now in active commercial use.

18-267. **Some Needed Precautions When Induction and Flame Hardening.** J. O. Almen. *Metal Progress*, v. 46, Dec. '44, pp. 1263-1267.

Surface hardening after carburizing produces parts with residual compressive stresses at the surface—a very desirable condition to enhance fatigue resistance against alternating loads in bending or torsion. Flame hardening produces lower surface compressions, and an underlying layer in tension dangerous to fatigue resistance. Induction hardening acts in a similar way, but the extent of this zone in tension can be limited by controlling frequency and power input.

18-268. **Quenching Oils.** Metallurgicus. *Metal Progress*, v. 46, Dec. '44, pp. 1273-1274.

Effective circulation for improving cooling rate of an oil.

18-269. **Hardenability of Some Cast Steels.** J. B. Caine. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 459-474.

Hardenability of some cast steels, and the correlation of these results with those of wrought steels reported. Results checked with those obtained, theoretically, from the chemical analysis. 7 ref.

18-270. **Heat Treatment of Medium Carbon Cast Steel in Moderately Heavy Sections, II.** K. L. Clark, H. F. Bishop and H. F. Taylor. American Foundrymen's Association *Transactions*, v. 52, Dec. '44, pp. 539-542.

Unrestricted heating rates, higher than usual temperatures of heating, abbreviated holding periods, and both water-quenching and normalizing with subsequent tempering treatments were tried as means of reducing "in-the-furnace" time. Results show that physical properties produced by the shorter treatments were equal to or, in most cases, better than those which were obtained from the annealed castings.

18-271. **Wartime Developments in the Heat-Treatment of Steel and Their Effect on the Design of Automotive Equipment.** H. W. McQuaid. *SAE Journal*, v. 52, Dec. '44, pp. 598-608.

Headed for an era in which our expanded knowledge will result in an increase in the actual strength of highly stressed parts, permitting an important reduction in the so-called "factor of ignorance." Will also be necessary for the metallurgist, the designer, and the production engineer to work together much more closely during the development of any important design, including the preparation of the stress analysis.

18-272. **Precision Electric Hardening of Naval Ordnance Parts.** Charles O. Herb. *Machinery*, v. 51, Dec. '44, pp. 140-147, 169.

By induction hardening, wearing surfaces of the internal teeth in the large training circles for naval gun mounts are uniformly hardened to a scleroscope reading of from 55 to 60 without distortion of the tooth form.

(Continued on Page 14)

Heroult and Induction Furnaces Best for Electric Steels

Reported by Warren A. Silliman
Chief Metallurgist, Cleveland Tractor Co.

While there have been many applications of electric furnaces to steel making, the Heroult and the coreless induction furnaces have been outstanding against the test of time, Gilbert Soler, superintendent of quality, Timken Roller Bearing Co., Steel and Tube Division, told the Cleveland Chapter December meeting. Mr. Soler outlined the background of the electric furnace steel industry, and said that the coreless induction furnace is generally used in smaller sizes, while the Heroult furnaces range from small sizes to a capacity of many tons.

The acid type electric furnace is more generally used in the steel foundry for castings since it permits the use of foundry scrap. The basic electric furnace is used for ingot production and generally applies to the larger furnaces. Sulphur and phosphorus can be reduced by the basic method which offers an advantage over the acid practice.

Carbon electrodes are used for smaller furnaces, and graphite, because of its better conductivity, on the larger furnaces.

Mr. Soler pointed out the relative merits of top charging versus door charging, top charging being faster but usually not giving as good a distribution of scrap. Top charging is employed primarily on small and medium sized furnaces while door charging is used on the larger furnaces of 50 tons and over.

Some of the advantages of the electric furnace are cleaner heats, since carbon is the only pickup from the heat source, flexibility of tonnage, flexibility of slag in refining the charge, minimum alloy losses, and the fact that large additions of alloy can be made while the heat is still in the furnace and under a reducing slag.

An interesting coffee talk on the activities of the F.B.I. was presented by Harry G. Maynor, assistant special agent of the Cleveland Field Division of the F.B.I.

Edsall Leaves Ajax for RCA; Winters Named Ajax Adv. Mgr.

Howard Linn Edsall, formerly advertising manager of the Ajax Metal Co., and affiliates, has been appointed advertising and sales promotion manager, Tube & Equipment Division, Radio Corp. of America. Mr. Edsall was recently appointed to the Advisory Committee of METAL PROGRESS.

Walt W. Winters has been appointed advertising manager of the Ajax Electric Co. Inc., Philadelphia. Previously he had been associated with the Automatic Temperature Control Co., Philadelphia.

Heads Section in Navy Conservation Div.

J. Ralph Fritze has been called to the Navy Department, Washington, D. C., to head up the Manufacturing Processes Section in the Conservation Division. One of the important functions of this section is to encourage manufacturers to submit new ideas and developments which will effect a more efficient use of existing manpower and facilities. The section also serves as a central agency through which manufacturers may refer various problems relative to metal processes and plastics.

Mr. Fritze comes to the Navy Department from the War Production Board where he spent 2½ years with the Conservation Division serving for the past year as chief of the Consumer and Structural Products Branch. Before joining W.P.B., he was materials engineer for the Edison General Electric Appliance Co. in Chicago.

Osborn Is Speaker at Pueblo

Reported by R. R. Robinson
Colorado Fuel and Iron Corporation

Speaking on the benefits of induction heating in war and peace, Harry B. Osborn, Jr., director of research for the Ohio Crankshaft Co. of Cleveland, told the Pueblo group, Rocky Mountain Chapter, on Nov. 16 that a much wider use of induction heating has been stimulated by the war. Dr. Osborn's talk has been reviewed when presented before other chapters of the Society.

Carl de Laval Goes to Pittsburgh Alloy Corp.

Pittsburgh Alloy Corp., Pittsburgh, has secured the services of Carl G. de Laval as vice-president in charge of sales. For the past ten years Mr. de Laval has been a salesman for the Electro Metallurgical Sales Corp. in the tri-state area.

A.S.M. Review of Current Metal Literature—*Continued*

18. HEAT TREATMENT (*cont.*)

18-273. **Builds New Laboratory to Explore and Engineer Electric Induction Heating.** *Steel*, v. 115, Dec. 4, '44, pp. 116-118.
High frequency induction experimental laboratory of the Tocco Division of the Ohio Crankshaft Co. Equipment described.

18-274. **The Annealing of Cast Steel.** A. Evers and E. Piwowarsky. *Archiv für das Eisenhuttenwesen*, v. 17, July-August, '43, pp. 35-42. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, 165-A.
Study of the effects of chromium and chromium plus molybdenum, the initial structure, the annealing temperature and time and the cooling rate on the properties of cast steel. The Ac_3 point for the 0.30% carbon steel used was 850° C. The annealing temperatures selected were 820°, 850°, 880° and 910° C. with holding times of 4½ hr., 1¾ hr. and 15 min. at each of these temperatures. The evaluation of the numerous test results showed that by careful selection of the annealing time a completely transformed structure and good mechanical properties could be obtained by annealing at temperatures slightly below or slightly above the GOS line; the selection of a precise annealing temperature was not essential for obtaining a maximum impact strength, but in all cases the annealing time had to be carefully adjusted to suit the temperature selected. The optimum elongation and reduction of area values were generally obtained after annealing at, or slightly above, the GOS-line temperature. The small additions of chromium and molybdenum used (up to 0.54% of chromium and 0.30% of molybdenum) improved the impact strength and tensile strength of steel made in the small bessemer converter but did not affect the strength of the open-hearth and electric-furnace steel. The impact strength, elastic limit and tensile strength were lower after cooling in the furnace than after cooling in air.

18-275. **Elimination of Flakes by Heat-Treatment.** G. Cholmogorov. *Stal*, v. 10, no. 9, '40, pp. 31-33; *Chem. Zentr.*, I, '41, p. 3437; *Alloy Metals Review*, v. 3, Sept. '44, p. 1.
Hydrogen content and segregation, rather than structural transformations and internal stresses, are the primary causes of flake formation. In low alloy steel ingots, flake formation can be almost entirely avoided by a preliminary anneal at 950° and cooling to 100° at a rate of 10 to 12° per hour, provided the steel is also cooled slowly after hot working.

18-276. **Ford Development of Centrifugal Casting and Heat Treatment of Aircraft-Engine Cylinder Barrels.** *Industrial Heating*, v. 11, Dec. '44, pp. 1987-1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002.
Advantages and Procedures.

18-277. **Theory and Practice of Induction Heating.** *Industrial Heating*, v. 11, Dec. '44, pp. 2004, 2006, 2008, 2010.
Principles involved in and the practical application of induction heating utilizing the various types of commercially available equipment.

18-278. **Conveyor-Type Salt-Bath Furnace Used for Annealing Brass Cartridge Cases.** *Industrial Heating*, v. 11, Dec. '44, pp. 2012, 2014, 2016.
Increased speed of production with a full, bright anneal.

18-279. **Effect of Alloys on Hardenability and Air-Hardenability of Steels.** *Industrial Heating*, v. 11, Dec. '44, pp. 2018, 2020, 2022, 2034.
Effect of carbon content on hardenability, the air hardenability of steels, the partition of molybdenum in steel and its relation to hardenability, and the rate of diffusion of molybdenum in austenite and in ferrite.

18-280. **Research in Metal Heating.** *Scientific American*, v. 172, Jan. '45, p. 38.
Cheaper and tougher metal parts for many uses are expected to follow as a result of research at a new laboratory for the development of wider applications of high frequency induction heating to the tasks of metal hardening, brazing and annealing.

18-281. **Three Million Steel Cartridge Cases Successfully Heat Treated by Electric Induction Heating.** Fred M. Arnold. *Steel*, v. 115, Dec. 25, '44, pp. 102, 105, 107, 122.
Advanced heat treating techniques.

18-282. **Employing the Corrosion Resistance of Stainless Steel for Surface Hardening.** R. C. Cunningham. *Steel*, v. 115, Dec. 25, '44, pp. 74-75, 116.
Two-step process develops controlled case hardened depth for superior resistance to wear under dry or lubricated conditions. Slight dimensional changes are predictable. Low temperatures with gradual changes minimize detrimental warpage.

18-283. **Annealing and Stress Relief of 3-in. Cartridge Cases.** Gerald E. Stedman. *Industrial Gas*, v. 23, Dec. '44, pp. 9-11, 28.
Lithium atmospheres.

18-284. **The Effect of Overheating on the Transformation Characteristics of a Nickel-Chromium-Molybdenum Steel.** K. Winterton. Iron and Steel Institute, Advance Copy, Nov. '44, 7 pp.
S-curve for a nickel - chromium - molybdenum steel has been determined by a dilatometric method, using an initial treatment of ten minutes at 850° C. By the same means the S-curve was redetermined after ten minutes treatment at 1200° C. (before treatment at 850° C.). The isothermal characteristics were also found for a prior treatment of only one minute at 1200° C. 8 ref.

18-285. **Some Observations on the Austempering and Isothermal Transformation of Steels, with Special Reference to the Production of Martensite.** F. C. Thompson and L. R. Stanton. Iron and Steel Institute, Advance Copy, Nov. '44, 38 pp.
Theoretical explanation based on the rate of recrystallization is offered to account for the shape of the typical S-curve representing the isothermal transformation of austenite; from the results of experimental work it is suggested that the retention of austenite and the subsequent "period of induction" depend on the relaxation of stresses set up in the material at the time of quenching. 42 ref.

18-286. **Case Hardening by Induction Heating.** Vernon W. Sherman. *Canadian Metals & Metallurgical Industries*, v. 7, Dec. '44, pp. 34-36.
Thin case hardening; advantages of megacycle heat treatment; applications. 4 ref.

19. WORKING
Rolling, Drawing, Pressing, Forging

19-317. **Deep Drawing Oil Sump Pans.** G. W. Birdsall. *Steel*, v. 115, Nov. 27, '44, pp. 74-77, 110, 112.
Improved die designs and drawing lubricants permit making 5½-in. deep draw in a single operation instead of two. Stamping plant adds resistance and arc welding, lead dip bath and lead burning facilities to completely finish parts.

19-318. **Forming and Parting Dies.** James Walker and Carl Taylor. *Steel*, v. 115, Nov. 27, '44, p. 88.
Special tools permit production in multiples; minimize distortion; simplify operations.

19-319. **Deep Drawing and Forming of Magnesium Sheet.** Arthur E. Meyer. *Iron Age*, v. 154, Nov. 30, '44, pp. 44-50.
Methods for accomplishing deep draws in a single operation, particularly the critically controlled heating of the magnesium sheet and the dies.

19-320. **Electric Drive Control.** *Iron & Steel*, v. 17, Nov. '44, pp. 682-683.
Applications of the "Metadyne" in steelworks.

19-321. **The Cold-Rolling of High-Tensile Strip Steels and Their Properties.** A. Pomp and W. Puzicha. *Mitteilungen aus dem Kaiser-Wilhelm-Institut für Eisenforschung*, v. 26, no. 2, '43, pp. 13-36. Abstract Iron and Steel Institution *Bulletin*, no. 106, Oct. '44, p. 150-A.
A report is presented on the effect of rolling at temperatures from -183° C. to +200° C. on the properties of steel strip.

19-322. **Bending and Forming Strip Metal.** R. Harries. *Machinery* (London), v. 64, Nov. 9, '44, pp. 520-521.
Simple method for small quantities.

19-323. **Heating and Rolling in the Bar Mill.** J. L. McHugh. *Iron & Steel Engineer*, v. 21, Nov. '44, pp. 44-47.
No set prescription may be made for heating and rolling steel, particularly in the bar mill, where so many items contribute to the success or failure of the operation. Each mill must be subjected to individual study and must be constantly improved.

19-324. **Main Roll Drives for Merchant-Bar and Rod Mills.** W. B. Snyder. *Iron & Steel Engineer*, v. 21, Nov. '44, pp. 48-58.
Many variables affect the power requirements of merchant mills, requiring much test data collected over a wide range of conditions. There is need for additional test work and for the collection of such data into usable form. 10 ref.

19-325. **Cast Steel Roll, Manufacture and Application.** F. H. Allison. *Iron & Steel Engineer*, v. 21, Nov. '44, pp. 59-62, 64-65.
No two mills are exactly alike in design, product, reductions and operator. Hence, roll application is not an exact science, but can be improved only by cooperation of the user and the manufacturer. A knowledge of roll manufacturing methods will enable the user to obtain greater service and economy.

19-326. **Rolling Alloy Steels at Atlas Steels, Limited.** C. P. Hammond and A. M. Cameron. *Iron & Steel Engineer*, v. 21, Nov. '44, pp. 66-73.
Cognizant of the fact that they cannot completely cover the field, the authors present an outline of some of the factors in the selection of a rolling unit to produce high alloy and special steels efficiently. Their viewpoint differs from that of the large producer of a limited number of grades.

19-327. **Alignment Charts for Bending Dies for 18-8 & 17-7.** C. M. Brown, W. O. Binder and Russell Franks. *Metal Progress*, v. 46, Dec. '44, pp. 1268-1272.
The use of alignment charts to solve bending and forming problems.

19-328. **Combining Stretch and Pressure Contour Forming.** *Iron Age*, v. 154, Dec. 7, '44, pp. 75-77.
Contour forming machine combining the operations of stretch forming and compression forming. Using dies of various shapes and sizes, this machine makes difficult contours out of sheets and plates as well as shapes and extrusions. Built with a pivoted hydraulic cylinder working in conjunction with it.

19-329. **Gap Mill Forging.** G. W. Birdsall. *Steel*, v. 115, Dec. 11, '44, pp. 116-119, 166, 168, 170, 172.
Eliminates metal wasted in forging flash; allows use of smaller forging blanks; improves fiber arrangement and thus raises quality of the forging; eliminates eight machining operations on typical forgings; makes important reductions in finishing costs. Wartime applications of process point way to greatly increased forging efficiencies in postwar era.

19-330. **New Unitemper Mill and Process.** M. D. Stone. *Steel*, v. 15, Dec. 11, '44, pp. 132-134.
New type mill operates on principle of continuous stretching and imparts necessary temper hardness to tin plate combined with satisfactory ductility and flatness for fabrication. Two independent 2-high mills mounted in same housings are provided with separate roll adjustment. Mills driven by separate motors. Average delivery speed is 2500 ft. per min. though operating limit is higher. Unit also suitable for production of high-finished sheets and strip mill items.

19-331. **Drawing Tubelike Tanks from Aluminum Disks.** Gordon B. Ashmead. *Machinery*, v. 51, Dec. '44, pp. 156-161.
Aluminum cartridge tank manufactured by the methods described has four main metal components—the body, top ring, insert, and cover ring.

19-332. **Deep Drawing Steel.** G. Eldridge Stedman. *Steel*, v. 115, no. 25, Dec. 18, '44, pp. 90, 91, 132, 134, 136, 139, 140.
Improved forming, heat treating, lubricating and other methods worked out by Norris Stamping & Mfg. Co. in producing steel cartridge cases are expected to prove useful when production is converted to peacetime products.

19-333. **Stretch Forming.** *Steel*, v. 115, Dec. 4, '44, pp. 126, 129.
Odd-shaped sections of aluminum alloy.

19-334. **Drop Forging.** *Automobile Engineer*, v. 34, Nov. '44, pp. 483-490.
Die design and the methods employed in the die sinking and forge departments described. Details given of the way that scientific control is exercised throughout all stages of production by systematized chemical, metallurgical and dimensional examination.

19-335. **Rubber Sheeting Speeds Up Metal Stretching Operations.** *Machinery* (London), v. 65, Nov. 16, '44, pp. 539-545.
Substitution of sheeting brought about revolutionary changes in the production procedure of the stretching department, eliminating all the disadvantages of grease and the incidental operations required for grease removal; procedure outlined.

19-336. **Cold Working and Forming of Silicon-Manganese Spring Steel.** R. G. Sartorius. *Iron Age*, v. 154, Dec. 14, '44, pp. 50-51.
The full annealing without graphitization of silicon-manganese spring steels has resulted in definite advantages in the cold working and forming of this grade of steel.

19-337. **Deep Drawing Steel.** G. Eldridge Stedman. *Steel*, v. 115, Dec. 18, '44, pp. 90, 132, 134, 136, 139-140.
Improved forming, heat treating, lubricating and other methods worked out by Norris Stamping and Manufacturing Co. in producing steel cartridge cases are expected to prove useful when production is converted to peacetime products.

19-338. **Theory of Wire Drawing.** E. A. Davis and S. J. Dokos. *Journal of Applied Mechanics*, v. 11, Dec. '44, pp. A-193-A-198.
Theory in which the force required to produce plastic deformation of a wire passing through a die may be determined; strain hardening of the wire being drawn is considered. 11 ref.

19-339. **Unitemper Mill and Process.** M. D. Stone. *Blast Furnace and Steel Plant*, v. 32, Dec. '44, pp. 1457-1459.
Temper roll in coil form; gradually the old style 2-high plain bearing temper pass mills have been replaced by modern 4-high mills.

19-340. **Difficult Parts Formed Easily with Die-Less Press Tools.** C. W. Hinman. *American Machinist*, v. 88, Dec. 21, '44, pp. 108-110.
Novel methods employed in preparing, reinforcing and setting up sheet-metal and other parts for shearing, notching or piercing without the use of dies.

19-341. **Fabrication With Wide Plates.** W. G. Theisinger. *Steel*, v. 115, Dec. 25, '44, pp. 76-78, 80, 109.
Reduces costs in making boilers, tanks and pressure vessels.

19-342. **Roll Forging and Twisting Process.** *Steel*, v. 115, Dec. 25, '44, pp. 82, 84, 86, 119.
Developed for production of shankless twist drills.

19-343. **Concerning the Mechanical Technology of Shaping Methods.** E. Siebel. *Metall-Wirtschaft*, v. 22, nos. 30-32, Sept. 20, '43, pp. 423-428.
Factors involved in the shaping of metallic materials are mathematically and graphically interpreted. Different methods of shaping, e. g., rolling, pressing, and drawing, analyzed.

19-344. **Concerning the Determination of Energy Required and the State of Stress in Wire Drawing.** Th. Poschl. *Metall-Wirtschaft*, v. 22, nos. 30-32, Sept. 20, '43, pp. 428-434.
Different steps in the process of wire drawing mathematically analyzed. Their relations are established by means of equations; the corresponding coefficients determined. This makes possible easy calculation of energy required and the state of stresses prevailing during the entire process.

19-345. **Deformation During Die Forging and the Dependence of the Strength Properties on the Position of the Blank in the Dies.** H. Unckel. *Metall-Wirtschaft*, v. 22, nos. 30-32, Sept. 20, '43, pp. 437-443.
The analysis of the stresses occurring in metal blocks, differently placed (according to their original directional axis) during die forging, explains the differences in the properties of the forgings produced from such blocks.

19-346. **A New Method of Heating of the Holding Chamber (In a Metal Extrusion Press).** F. Husarek. *Metall-Wirtschaft*, v. 22, nos. 30-32, Sept. 20, '43, pp. 443-447.
Different types of extrusion presses, together with several methods of heating holding chambers, are comparatively analyzed. Description of a holding chamber newly designed and electrically heated is presented; the advantages of such installation emphasized.

19-347. **Plastic Dies for Forming Light Metals.** W. Krause. *Metall-Wirtschaft*, v. 22, nos. 30-32, Sept. 20, '43, pp. 447-449.
Dies for use in pressing aluminum aircraft parts with pressure applied through a rubber blanket are made from a special phenol-formaldehyde plastic.

20. MACHINING AND MACHINE TOOLS

20-452. **Machining Cylinder Heads for the Merlin Engine.** *Machinery* (London), v. 65, Oct. 26, '44, pp. 449-456.
Rolls-Royce methods at a Ministry of Aircraft production factory.

20-453. **Points in Production Planning.** D. Braid, *Machinery* (London), v. 65, Oct. 26, '44, pp. 462-464.
Machine loading; modification to design; economic quantities.

20-454. **Careful Cutter Sharpening Equal in Importance to Proper Design.** Roger W. Bolz. *American Machinist*, v. 88, Nov. 23, '44, pp. 102-103.
Three types of runout which occur through faulty equipment may cause uneven thread form and reduce cutter life greatly.

(Continued on Page 16)

Employment Service Bureau

Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated. Applicants for the positions listed below are required to observe the rules and regulations of the War Manpower Commission regarding a Statement of Availability, if employed in an essential activity.

Positions Open

RESEARCH METALLURGIST: For laboratory research and plant development on heavy steel castings. Metallographic and physical testing experience and report writing ability essential. Prefer young man with two to three years' experience; salary commensurate with experience. Write to Metallurgist, United Engineering & Foundry Co., Vandergrift, Pa.

SALES ENGINEERS: Preferably with chemical or mechanical background, wanted by well-known industrial instrument company looking forward to post-war expansion. Work requires persistence and ability to cooperate as consultant with prospects rather than high pressure selling. Positions open in several sections of the country. Box 1-5.

SALES ENGINEERS: Two territories open for sale of a new water diluting cutting fluid. This product has been on the market for two years, and is sold nationally. Territories are metropolitan Cleveland and metropolitan Chicago. Men experienced in the application of cutting fluids and tools should qualify. A guarantee and very liberal commission are paid. Box 1-10.

SALES ENGINEER: Man experienced with insulating refractories and refractory specialties needed by large national manufacturer offering excellent post-war opportunities. Write in detail giving age, draft status, experience and salary requirements. Box 1-15.

DEAR DOCTOR: Are you interested in making a connection with an organization (classified as an essential industry) where you would have plenty of opportunity to exercise your metallurgical knowledge and in addition have a splendid opportunity to write and compile articles on metallurgical subjects?

If you are enthusiastic about writing and correcting other writers' work, we believe you would be happy in this job.

You will be in a small organization of about 15 people and you will find all of them exceptionally well qualified in the work they are doing.

If you have had experience in teaching, it would be especially helpful because the type of work involved is largely of an educational nature.

Everyone in our organization knows of this opening. We would like to have associated with us a young man about 30 years old with his doctor's degree in metallurgy.

This association will be a life-time connection in most enjoyable work, and with ideal working conditions.

Please write, giving full details of your education and experience and be assured your letter will be held in strict confidence. Box 1-110.

METALLURGIST: Openings for graduate metallurgists with experience in any of the following lines: Forging, heat treating of alloy steels, tools and dies; gas or electric welding. Established company in Cleveland with postwar possibilities. Send full application details. Box 1-95.

METALLURGIST: B.S. Degree. Several years' tinplate experience required; for container manufacturer in Eastern Pennsylvania. Excellent opportunity. Give details experience, personal data, etc. Address Box 1-100.

SALES ENGINEER: To handle induction heating equipment; territory, Indiana, Illinois and Missouri; by pioneer in this field. Should have thorough knowledge of heat treating process. State age and experience. Box 1-105.

Positions Wanted

SALES MANAGER: Both alloy steel and non-ferrous metal experience. Interested in position with aggressive metals producer, fabricator, warehouse or manufacturer of metal working equipment. B. S. in Mechanical Engineering, age 30. Successful record in developing new markets for alloy metals among both consumer goods and capital goods industries in Ohio, West Virginia and Pennsylvania. Box 1-20.

SALES AND PRODUCTION EXECUTIVE: Wide experience in alloy metals. Desires management position and preferably some financial interest in company allied with the metal industry. Great experience in development and sale of new products. Presently employed by large company. Also own and operate small company employing 30 people. Would consider merging latter company with organization of my choice. Mechanical engineering degree; age 31. Box 1-25.

METALLURGICAL AND MECHANICAL ENGINEER: Degree of Doctor of Engineering; progressive and efficient. Broad European and American experience in research and development and production. Interested in permanent position. Box 1-30.

METALLURGICAL AND CHEMICAL ENGINEER: Chief engineer of plant converting to manufacture in wood desires executive engineer or metallurgy position in war plant with post-war future. Experience includes chief metallurgist of large aircraft plant for 2 years, supervising research and production of low and high pressure molded plastics; 4 years' responsible charge on faculty of prominent engineering school. Just over induction age. Box 1-35.

METALLURGIST: Eleven years metallurgical experience, five in laboratory and six as production plant metallurgist. Experience covers general heat treatment, induction heating, general plant processing problems and some non-ferrous work. Box 1-40.

METALLURGICAL ENGINEER: Investigational and developmental. Six years' broad experience in failure analysis, fatigue testing, heat treating problems, and forging practice. Not currently engaged to fullest ability. Desires position with post-war future in plant presently doing war work. Has had considerable technical customer contact work. Box 1-45.

CHEMICAL - METALLURGICAL ENGINEER: B.S. Ch.E., major in metallurgy; age 25, draft deferred. Three years' diversified experience in ferrous and non-ferrous metals and alloys. Not employed at highest skill. Desires position with post-war future in small, aggressive company. Location east or midwest. Box 1-50.

METALLURGICAL ENGINEER: Master's degree in metallurgy. Experience in steel manufacture. Past five years at home office of large company operating gray iron foundries; responsible for melting operation, research, and training of foundry personnel. Desires position in new field, with firm making important contribution to war effort, and having definite post-war possibilities. Box 1-55.

METALLURGIST: Graduate; nine years' experience in metallography, research and development, investigations, mill control and annealing and heat treating of carbon and alloy steels; also some customer contact experience. Would like position as laboratory supervisor, chief metallurgist or trouble shooter. Responsible and conscientious. Prefer Cleveland or vicinity, but free to move. Box 1-60.

CHIEF METALLURGIST or supervisor of heat treating department: Experienced on high speed steels, plain carbon and alloy steels, non-ferrous materials. College graduate in metallurgy; age 35. Foundry course graduate and former superintendent of gray iron foundry. Status 2-B. Built and supervised metallurgical laboratory for Westinghouse. 12 years' metallurgical experience. Minimum salary $500. Will consider investment in commercial practice. Box 1-65.

SALES EXECUTIVE: Chemical engineering and industrial engineering degrees. Administrative or executive work desired. Eleven years as sales executive, production manager and manager of sub-contract branch of large eastern firm. Experienced in industrial engineering investigation and research, production control, manufacturing supervision, contract distribution, and personnel. Broad manufacturing and administrative experience. Box 1-70.

SALES ENGINEER: Do you need a technically trained man to represent you in either metallurgical or ceramic fields? Graduate engineer experienced in steel production, ferrous metallurgy and research procedures. Also porcelain enameling and steel mill refractory problems. Now with large steel producer. Available for interview New York City. Family man, young, will move. Must be essential work. Box 1-75.

REGIONAL SALES MANAGER: Mechanical engineer desires to direct sales and related engineering in middle west from Chicago headquarters. Eighteen years' engineering experience in farm tractors, internal combustion engines, automotive, steel foundry, metallurgy and refrigeration; 3 years consulting design and liaison engineer in Washington, D. C. Age 43. Box 1-80.

METALLURGIST: Technical experience in non-ferrous powder metallurgy, production process control, development and research, physical testing and inspection. Location St. Louis, Mo., or vicinity. Box 1-85.

ENGINEER: Degrees in metallurgy and chemistry; long and varied experience in research and control of ferrous and non-ferrous materials. Wishes connection to direct research and development control. Box 1-90.

PHYSICAL METALLURGIST-CHEMIST: Heat treating methods, control heat treating department, plain and alloy steels; magnaflux; direction of metallurgical, metallographic and chemical laboratory; some experience in brass and zinc coated wire; dies, precision centrifugal steel casting; austempering. Reads several continental languages. Executive ability; above draft age. Box 9-55.

"Physics of the Solid State" Is Subject of Two-Day Symposium

A symposium on "Physics of the Solid State" was held by the American Physical Society during its 1944 annual meeting in New York Jan. 19 and 20. The symposium was arranged by S. Dushman, T. A. Read, F. Seitz, W. Shockley, S. Siegel and R. Smoluchowski, and consisted of 14 papers as follows:

Whither American Physics? F. Seitz, Carnegie Institute of Technology.

The Effect of High Hydrostatic Pressures on the Plastic Properties of Metals. P. W. Bridgman, Harvard University.

Amplitude Dependence of Internal Friction of Metals. T. A. Read, Frankford Arsenal.

Virtues and Weaknesses of the Domain Concept. W. F. Brown, Jr., Naval Ordnance Laboratory.

The Fracture Stresses in Steels. C. M. Zener, Watertown Arsenal.

Mechanical Properties and Structure of Alloys. M. Gensamer, Carnegie Institute of Technology.

Some Aspects of the Theory of Ferromagnetism. J. H. Van Vleck, Harvard University.

Creep of Metals as a Reaction Velocity. S. Dushman, General Electric Co.

The Statistical Problems in Cooperative Phenomena. G. H. Wannier, University of Iowa.

Effect of Small Stresses on Magnetic Properties. R. M. Bozorth, Bell Telephone Laboratories.

Ferromagnetic Impurities in Solids. F. W. Constant, Duke University.

Magnetization of Gold-Iron and Gold-Nickel Alloys. A. R. Kaufmann, S. T. Pan, and J. R. Clark, Massachusetts Institute of Technology.

A Recording Fluxmeter of High Accuracy and Sensitivity. P. P. Cioffi, Bell Telephone Laboratories.

A.S.M. Review of Current Metal Literature — *Continued*

20. MACHINING (*cont.*)

20-455. **Practical Ideas.** *American Machinist*, v. 88, Nov. 23, '44, pp. 107-112.
A handy master jig for flat jobs. Two-step reamer speeds up production. Mandrel maintains uniform thickness of swaged tubing wall. Design of special equipment based on shape of parts. Holding device for small runs of odd-shaped parts. Auxiliary toolslide grooves part while finish turning on automatic. Change of methods and cutters reduces milling time. Four-way inspection block speeds gaging of small parts. Fixture for grinding multisided sections on bar stock. Fixture attachment removes parts without marring to avoid reworking.

20-456. **Selection and Application of Single-Point Tools.** *American Machinist*, v. 88, Nov. 23, '44, pp. 113-124.
To obtain maximum production from cutting tools: (1) Selection of the right tool for the job, (2) proper tool sharpening, (3) proper use of the tool in the machine, and (4) having enough tools on hand so there will be no loss of machine time for resharpening and replacement.

20-457. **Boosts Production of Tough Steel Link.** Delmer H. Rhino. *Steel*, v. 115, Nov. 27, '44, pp. 81, 122.
Carbide tipped shell end mill with negative rake.

20-458. **Methods and Equipment Used for High-Production Grinding.** R. P. *Machinery* (London), v. 65, Nov. 9, '44, pp. 513-516.
Applying sizing devices to a variety of gaging and measuring problems.

20-459. **Machine Tapping and Tapping Head Attachments.** H. J. Andrew. *Machinery* (London), v. 65, Nov. 9, '44, pp. 522-523.
Machine-tapping small-diameter full-thread blind holes in tough material.

20-460. **Machining Fatigue Test Pieces.** H. Ford. *Machine Shop Magazine*, v. 5, April '44, pp. 44-46. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 158-A.
Accurately curved necks were required to be turned on cylindrical specimens for fatigue testing and the lathes available were unsuitable for the work. Description of a radius-turning attachment designed for this work and proved satisfactory when mounted on one of the lathes.

20-461. **Comparative Cutting Tests of a Diamond Tool and a High-Speed Tool.** M. E. Merchant. *Industrial Diamond Review*, v. 4, June '44, pp. 119-124. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 158-A.
Investigations carried out by the research department of the Cincinnati Milling Machine Co., to find the coefficient of friction between a diamond cutting tool and the chip described. For comparison purposes the tests were also made on a tool of 18-4-1 high speed steel.

20-462. **How to Choose and Use Carbide-Tipped Tools.** J. Jacquet. *La Pratique des Industries Mecaniques*, v. 26, no. 10, Jan. '44, pp. 147-152. *Engineers' Digest*, v. 1, Nov. '44, pp. 682-685.
Recommendations; cutting conditions; control of tools; types of carbide-tipped tools.

20-463. **Machining of Plastics with Ceramic Tools.** W. Osenberg. *Plastics*, v. 8, Nov. '44, pp. 509-514.
Manufacture of ceramic tools; tool life investigation. 10 ref.

20-464. **Hydro-Piercing Difficult Steel Plates.** C. W. Hinman. *Steel Processing*, v. 30, Nov. '44, pp. 714-717.
Piercing awkwardly shaped parts, stoker panel holes, holes in front fenders hydraulically, fenders; stripper plates clamp and position the work; piercing, coining and flanging in one operation.

20-465. **Safety in the Use of Metal-Working Milling Machines.** *Western Metals*, v. 2, Nov. '44, pp. 84, 86.
Compilation of experience.

20-466. **New Accuracy and Perfection of Finish Achieved by Liquid Honing.** *Steel*, v. 115, Nov. 27, '44, p. 100.
Peening effect of abrasive emulsion also improves physical properties and fatigue life of metal parts. Increases of 200% in tool life achieved.

20-467. **Broaching Vs. Milling in Manufacturing Rifle Parts.** I. A. Swidlo. *Iron Age*, v. 154, Dec. 7, '44, pp, 62-69, 156.
The substitution of broaching for milling operations on the Garand semi-automatic MI rifle has resulted in a decrease of 57% in the cost of manufacture and 50% in the number of manhours required. Analysis of comparative capital costs for equal production. Broach tooling for the heaviest part of the rifle, the receiver.

20-468. **Cutter Body Materials Selected with an Eye to Application.** M. Martellotti. *American Machinist*, v. 88, Dec. 7, '44, pp. 100-102.
Economy of materials and over-all performance determine whether a cutter should be of the solid or inserted-tooth type.

20-469. **Master Plate Controlled Machine Speedily Bores Dividing Head Holes.** *American Machinist*, v. 88, Dec. 7, '44, p. 103.
Machine has an Ex-Cell-O high-speed precision boring head which is used both in drilling—at 2500 r.p.m. —and in boring—at 5200 r.p.m.—the index plate for a hypoid universal spiral bevel gear dividing head.

20-470. **Carbide-Tipped Face Mills Best With 10-deg. Negative Radial Rake.** F. W. Lucht. *American Machinist*, v. 88. Dec. 7, '44, pp. 106-108.
Series of tests with face mills cutting SAE 1045 steels, with hardness of 200 Brinell, prove that positive rake angles are least satisfactory in providing long, consistent cutter life.

20-471. **Practical Ideas.** *American Machinist*, v. 88, Dec. 7, '44, pp. 111-116.
Accuracy of worn micrometers restored by lapping. Salvaged worn-out milling cutters allow high speeds and feeds. Cover for heavy files removes hazard of injury. Small bearings cleaned and burnished with a draftsman's eraser. Rigid support extends life of carbide-tipped lathe tools. Indicating device checks accuracy of cutting lips of reground drills. Altering drafting furniture provides more reference space. Fixtures for machining controller ring dials. Extension reclaims short drills and simplifies drilling in difficult locations. Modified pliers for bending cotter pins. Eliminates hazard of hand injuries.

20-472. **Dressing Grinding Wheels.** W. Fay Aller. *Mechanical Engineering*, v. 66, Dec. '44, pp. 779-782.
Developments made possible by plunge form and thread grinding and the crush-dressing process.

20-473. **Large Rotating Work on Horizontal Boring Machines.** G. I. Danly. *Machinery*, v. 51, Dec. '44, pp. 162-168.
Unorthodox machine shop methods expedited naval ordnance production. Horizontal boring, drilling, and milling machines are used not only for customary operations but also for the turning, boring, and facing of surfaces large in diameter. Huge weldments must be rotated to permit the taking of a number of cuts which would ordinarily be performed on vertical boring mills.

20-474. **Negative-Rake Cutters Hollow-Drill Armor Plate.** Charles O. Herb. *Machinery*, v. 51, Dec. '44, pp. 170-173.
Armor plate had to be closely checked for hardness at intervals of about one inch through the entire thickness at a point within the solid body of the plate, and not merely along external surfaces. Cutter was developed with the carbide tips brazed to the steel body, and this proved satisfactory.

20-475. **Refrigeration of Coolants for Machine Tools.** B. S. Williams. *Machinery*, v. 51, Dec. '44, pp. 196-198.
Importance of maintaining coolants and cutting oils at a low temperature. Equipment available for the refrigeration of coolants.

20-476. **Tooling the Automatic Screw Machine, XI.** Noel Brindle. *Modern Machine Shop*, v. 17, Dec. '44, pp. 160-162, 164, 166, 168, 170, 172.
Producing long parts on a small size machine.

20-477. **Ideas from Readers.** *Modern Machine Shop*, v. 17, Dec. '44, pp. 216, 218, 220, 222, 224, 226.
Expansion arbor of simple design. Clamping small work on a large table. Perfect alignment in welded tube joint. Swinging arm for portable hand shear. Alternating-current arc welder used to demagnetize tools.

20-478. **More Planer Work in Less Time.** John E. Hyler. *Tool Egineer*, v. 14, Dec. '44, pp. 67-71.
Streamlining planer operations.

20-479. **Automatic Machines for High Production.** *Tool Engineer*, v. 14, Dec. '44, pp. 78-81.
Continental Motors develops special tooling to meet mass production schedule on aircraft-type tank engine. Unskilled employees work to close tolerances.

20-480. **Fixture Designs Simplify Operations.** *Tool Engineer*, v. 14, Dec. '44, pp. 81-82.
Norge machine shop tools for manufacture of Navy gun on standard equipment, with emphasis on the idea that an idle man costs more than an idle machine.

20-481. **Ingenious Machines Slash Man-Hours.** *Tool Engineer*, v. 14, Dec. '44, pp. 83-84.
Kaydon Engineering designs and builds machines to eliminate hand scraping on gun mount bearing surfaces, saving more than 90% of manpower required for job. Based on boring mill design, chief features are compound cross rail and precision bearings in table and base.

20-482. **Tool-Testing Lathe.** *Tool Engineer*, v. 14, Dec. '44, p. 99.
Direct drive from variable speed motor for high speed, with reduction to four lower speed ranges, and wide feed ranges, are features of this special lathe developed for experimental work by a British manufacturer.

20-483. **The Art of Metal Cutting, II.** *Machine Tool Blue Book*, v. 40, Dec. '44, pp. 199-200, 202, 204, 206, 208, 210.
Tantalum and titanium carbides as cutting materials.

20-484. **Old Machine Tools Improved by Electronic Control.** *Steel*, v. 115, Dec. 4, '44, p. 134.
Stepless-speed drive results in simplified, more accurate finishing and better working conditions.

20-485. **Lockheed Data for Carbide Milling of Ferrous and Non-Ferrous Metals.** W. H. Arata. *Automotive Industries*, v. 91, Nov. 15, '44, pp. 34, 36, 38.
Factors which apply to all types of milling completely investigated. "Hi-cycle" milling and "Hypermilling".

20-486. **Milling T-Slots with Negative-Rake Milling Cutters.** *Machinery* (London), v. 65, Nov. 2, '44, p. 488.
Details of the two cutters.

20-487. **Multi-Tool Steel Turning with Carbide-Tipped Cutters.** R. G. *Machinery* (London), v. 65, Nov. 2, '44, pp. 494-496.
Nose radius, rake and chip-breaker width.

20-488. **Bryant Symons Diamond Tool Lathes.** *Machinery* (London), v. 65, Nov. 2, '44, pp. 497-499.
Design and use.

20-489 .**Broaching versus Milling in Manufacturing Rifle Parts.** I. A. Swidlo. *Iron Age*, v. 154, Dec. 14, '44, pp. 52-58.
The details of broach tooling for a long slender part. Comparative data on milling operations to produce the same daily output are given.

20-490. **Production of the Merlin Engine.** *Machinery* (London), v. 65, Nov. 16, '44, pp. 533-537.
Application of Cincinnati Hydro-tel milling machine to machining the vane rings of the supercharger.

20-491. **High Velocity Contour Sawing.** H. J. Chamberland. *Steel*, v. 115, Dec. 18, '44, pp. 94, 96, 98, 150.
Band saws now being operated at speeds of 7000 to 10,000 ft. per min. provide increases up to 700% in cutting rate along with improved finish.

20-492. **Hole Punching Systems.**. *Steel*, v. 115, Dec. 18, '44, pp. 108, 154.
Make production of perforating die a simple assembly job. Vertical units mount to templates or direct to die sets for longer runs on sheets. Horizontal type pierces flanges, angles, and container sides.

20-493. **Multiple Hole Punching Die Quickly Assembled.** *Iron Age*, v. 154, Dec. 21, '44, pp. 48-49.
Quick assembly type hole punching system leads to the release of experienced die makers and die setters and to the use in their place of any good mechanic who can put the assembled type die into operation. Wales "CD" hole punching system utilizes a unit consisting of a punch assembly and a die assembly.

20-494. **Broaching Versus Milling in Manufacturing Rifle Parts.** I. A. Swidlo. *Iron Age*, v. 154, Dec. 21, '44, pp. 50-53.
Broach tooling and fixture design for machining a part that is finally whittled down to a thin walled shell.

20-495. **Shankless Twist Drill Introduced.** *Iron Age*, v. 154, Dec. 21, '44, pp. 59, 136.
A new style high speed steel drill with a continuous flute that is driven by a removable taper shank generally furnished with a Morse taper to fit the spindle of the operating machine or drill press.

20-496. **Selection of Precision Taps.** R. R. Williams. *Tool and Die Journal*, v. 10, Dec. '44, pp. 90-91.
Specifications by purchaser; new taps cut oversize; tap testing requirements.

20-497. **Copper Segment Blanking Die.** Alex S. Arnott. *Tool and Die Journal*, v. 10, Dec. '44, pp. 94-95.
Cutting copper segments accurately in large quantities for electrical motor armatures is solved by machining copper bars to size and stamping them out to the shape or form required with a special blanking die.

20-498. **Carbide Machining of Steels on Automatic Screw Machines.** Carl W. Blade. *Tool and Die Journal*, v. 10, Dec. '44, pp. 98-99, 126.
Speeds and feeds; horsepower; roughing cuts; cut-off tools; rake angle; tool grinding; coolant.

20-499. **Motor-Driven Positioners Simplify Operations on Gun Parts.** *American Machinist*, v. 88, Dec. 21, '44, pp. 100-101.
Fixtures designed and built by Fisher Body reduce production costs and provide added safety for both machinists and welders.

20-500. **Understanding of Cutter Elements Will Aid in Selection and Sharpening.** M. Martellotti. *American Machinist*, v. 88, Dec. 21, '44, pp. 102-104.
Cutter is a collection of geometric shapes produced in tool steel.

20-501. **Practical Ideas.** *American Machinist*, v. 88, Dec. 21, '44, pp. 111-116.
Lathe fixture for machining three-sided parts with one set-up. Adapter for trunnion shafts allows four cuts on one centering. Straddle micrometer insures uniformity of panel surface contacts. Fabricated nuts with square threads meet close tolerances. Cone-shaped guide provides accuracy of hole-saw enlargements. Compound angles ground on 20 tools at each set-up. Index stop speeds machining of parts on a lathe. Finished gears removed from arbor by a carriage attachment. Gage checking procedure standardized by use of layout blue. Diamond wheel-truing device speeds up grinding operations. Vise type fixture simplifies machining of small angular parts. Keys made from bar stock by swaging.

20-502. **Water Soluble Lubricants.** John H. Richards. *Steel*, v. 115, Dec. 25, '44, pp. 88, 90, 93.
Earlier limitations of "water base" oils overcome through modern emulsifying methods such as homogenizing and their use has contributed to development of higher speed machining practice. Tests indicate new fields for soluble types in lubricating moving parts.

21. CLEANING AND FINISHING

21-151. **Reclamation of Bearings.** Hudson T. Morton. *Aero Digest*, v. 47, Nov. 15, '44, pp. 119-120, 126, 128, 130.
Cleaning methods; avoiding corrosion; drying parts; bearing inspection.

21-152. **Organic Finishes for Magnesium,** by Gilbert C. Close. *Light Metal Age*, v. 2, Nov. '44, pp. 20-22.
Requirements of primer and finished coatings. Preanalysis concerning the product's application before deciding the coating requirements.

21-153. **Electrolytic Polishing.** S. Wernick. *Steel*, v. 115, Dec. 11, '44, pp. 146, 148, 176, 178, 180.
Favorable for treatment of practically every common metal, especially stainless steel. Copper, nickel, aluminum, zinc, tin, lead and brass indicate more or less promising possibilities for further development.

21-154. **Measuring Methods Described for Surface Roughness Specification.** James A. Broadston. *Product Engineering*, v. 15, Dec. '44, pp. 806-810.
Measuring and specifying surface roughness to point the way toward standardization of such procedures. Taper-sectioning technique described along with methods for establishing defined standards through use of an Amsler Integrator, and ways of determining RMS micro-inch values from Brush Analyser record tapes. 9 ref.

21-155. **Convection Vs. Radiant Curing of Industrial Finishes.** Charles C. Eeles. *Industrial Gas*, v. 23, Dec. '44, pp. 18-19, 28-31.
Drying of metal finishes by radiation and by convection with particular attention to the relative speeds with which the cure may be completed.

21-156. **How Cadillac Uses Production Shot Peening.** R. L. Orth. *Steel*, v. 115, Dec. 18, '44, pp. 89, 131.
Shot peening important for the improvement of the physical properties of steel and metal parts. With the shot peening process, shot is driven against the surface of the parts to be treated by means of an air blast or the rotating blades of a wheel, thereby cold working the metal at or near the surface and thus considerably increasing its fatigue strength and resistance to surface damage, pitting corrosion and decarburization. The process is advantageous for use in treating irregular shapes which cannot be readily heat treated without danger of distortion or cold worked by rolling or drawing. Cadillac's use of process described.

21-157. **Suggestions for Selection of Polishing Wheels.** G. A. Lux. *Metal Finishing*, v. 42, Dec. '44, pp. 739-742.
Various types of commercial polishing wheels, the materials from which they are constructed, their special characteristics, and some of the types of polishing operations in which they find application.

21-158. **Testing and Evaluating Finishes at Lockheed.** S. G. Andrews. *Metal Finishing*, v. 42, Dec. '44, pp. 780, 782.
Program of testing and study at Lockheed. Different methods of application were tried and various conditions under which tests were made taken into consideration.

Metal Literature Review

21. CLEANING & FINISHING (*cont.*)

21-159. **Cleaning Air Compressors and Air Receivers.** *Metal Finishing*, v. 42, Dec. '44, pp. 784-785.
Safe procedure. Hazards.

21-160. **Semi-Automatic Spray Set-Up Speeds Finishing.** *Die Casting*, v. 2, Dec. '44, pp. 64, 66.
Machine for spraying end bells; rotating disk carries the parts to be finished between the two spray guns. Parts sprayed are die castings or a combination of die cast and stamped elements. Loading and unloading done by hand.

21-161. **Finishing Aluminum With Paint Coatings.** Robert I. Wray. *Industrial Finishing*, v. 21, Dec. '44, pp. 24-26, 28, 30, 32, 34.
Cleaning and proper treatment of aluminum surfaces previous to painting or finishing. 4 ref.

22. WELDING, BRAZING AND FLAME CUTTING

22-554. **Learning Arc Welding Design by Welding Shop Equipment.** Walter J. Brooking. *Iron Age*, v. 154, Nov. 30, '44, pp. 58-64.
Beginning designer can gradually accumulate enough experience to apply arc welding to the plant product on a mass production basis. Acquires a sense of proportion and knowledge of fabrication methods necessary to the successful application of the arc welding technique.

22-555. **Pressure Welding.** A. R. Lytle. *Canadian Metals and Metallurgical Industries*, v. 7, Nov. '44, pp. 34-40.
Produces welds with excellent physical properties; pressure and blowpipe equipment; types of joints; control; metal compositions amenable to pressure welding; physical properties; microstructure; economy; application of the process; merits.

22-556. **Aluminum Welding With LP-Gas.** J. V. Kielb. *Western Metals*, v. 2, Nov. '44, pp. 64, 66.
Advantages; thermal content; setting neutral flame.

22-557. **Soldering and Brazing Aluminum.** *Light Metal Age*, v. 2, Nov. '44, p. 23.
Aluminum article dipped into a molten tinning bath and connected to an electrical high frequency magnetostriction device. Particles act under hammer blow impact upon the oxide coat which covers the aluminum. Tin replaces the oxide coat and is bonded to the aluminum by an alloying weld.

22-558. **The Principle, Application and Development of Oxygen Cutting.** R. E. Dore. *Proceedings* of the South Wales Institute of Engineers, v. 60, '44, pp. 72-121. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 157-A.
Development, present position and probable future of oxygen cutting. All aspects are dealt with including automatic profile cutting, the oxygen lance, cutting cast iron, flame deseaming, underwater cutting, and cutting with oxygen in conjunction with acetylene, propane and coal gas.

22-559. **Industrial Application of Automatic Submerged Arc Welding.** R. R. Sillifant. *Proceedings* of the South Wales Institute of Engineers, v. 60, '44, pp. 40-56. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 157-A.
Unionmelt welding process and its application for welding boilers and pressure vessels given.

22-560. **The Testing of Welds in the Laboratory and the Workshop.** J. Davidson. New Zealand Institute of Welding: *Australasian Engineer Science Sheet*, June 7, '44, pp. 26-29. Abstract, Iron and Steel Institute *Bulletin*, no. 106, Oct. '44, p. 157-A.
Welders should not only be skillful in the manipulation of their tools and the materials they are welding, but should also be conversant with the tests to which welds are subjected. Brief descriptions of the principal methods of testing given.

22-561. **Induction Brazing of Bomb Burster Units.** Harry R. Lebkicher. *Metals and Alloys*, v. 20, Nov. '44, pp. 1304-1310.
Pictorial article presents the operating steps in the silver-alloy-brazing of one of the many chemical warfare service products now being fabricated.

22-562. **Spot Welding Magnesium Alloys.** *Light Metals*, v. 7, Nov. '44, pp. 552-560.
Recent American work detailing the technique and limitations of the spot welding process as applied to the ultra-light alloys and types and characteristics of spot welding. Mechanical properties and compositions of typical alloys.

22-563. **Tool Steel Welding.** E. L. Foote. *Iron Age*, v. 154, Dec. 7, '44, pp. 70-74.
Data show how closely the characteristics of the weld deposit conform to those of all basic types of tool steel.

22-564. **Process Control for Spotwelding Aluminum.** *American Machinist*, v. 88, Dec. 7, '44, pp. 117, 119.
The cleaning of aluminum alloys prior to spot-welding.

22-565. **Pressed Assemblies for Brazing.** A. K. Phillippi. *Metal Progress*, v. 46, Dec. '44, p. 1275.
The strongest joints result from assemblies of 0.002-in. press fit. Disadvantage of tighter fits is that it takes a longer furnacing time, to permit the copper to penetrate.

22-566. **British Practice in Gas Welding of Wrought Aluminum Alloys.** E. R. Yarham. *Modern Machine Shop*, v. 17, Dec. '44, pp. 178-180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 205-206, 208, 210.
Welding flame data on the available gases.

22-567. **Silver Alloy Brazing.** Harry R. Lebkicher. *Steel*, v. 115, Dec. 11, '44, pp. 120-122, 124.
Paramount factors governing production of products for Chemical Warfare Service are perfection of output and speed of manufacture. Many items made of thin metals and joined by special silver brazing techniques pass severe service tests.

22-568. **Progress in Automatic Arc Welding.** R. F. Wyer. *Machinery*, v. 51, Dec. '44, pp. 189-191.
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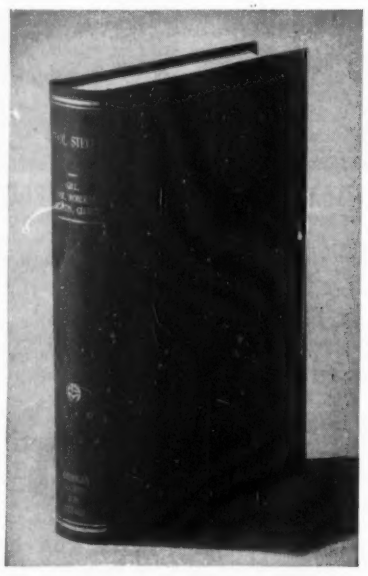

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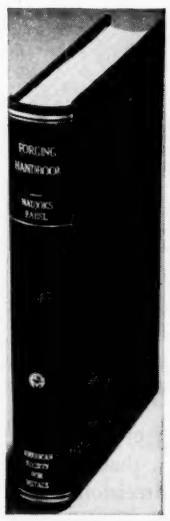

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22-569. **Heavy Spotwelding.** F. Albrecht. *Steel,* v. 115, Dec. 11, '44, pp. 136, 139.
Large and versatile resistance welding machine combines several sources of power with differential pressure control to handle wide range of welding work efficiently. Breaks several important bottlenecks in aircraft plant due to exceptional performance on difficult spotwelding jobs.

22-570. **Solderless Terminals.** F. H. Wells and J. C. Balsbaugh. *Electrical Engineering Transactions,* v. 63, Dec. '44, pp. 933-938.
Description; soldered terminals; test procedures and measurements; test results; resistance measurements on individual strands of a stranded wire with a solderless terminal; effect of different contact metals with copper; effect of temperature during the corrosion cycle.

22-571. **Production Applications of Flash Welding.** Robert Milmoe. *Welding,* v. 12, Nov. '44, pp. 484-492.
Practical applications of flash welding with special reference to the aircraft industry; procedures of tooling requirements, machine settings and general production practice.

22-572. **The Arc Welding of High Tensile Steels.** H. F. Tremlett. *Welding,* v. 12, Nov. '44, pp. 493-500.
Putting before the welder essential metallurgical aspects of the welding of high tensile steels. A scheme suggested which should enable the welder to select a procedure that would, in the majority of cases, eliminate the risk of cracked joints. 5 ref.

22-573. **Welding on the Normandy Beaches.** J. M. Whitworth. *Welding,* v. 12, Nov. '44, pp. 501-503.
Welding carried out on the Normandy beaches, which helped to make the British landing a success.

22-574. **The Welding Department.** H. Marquand. *Welding,* v. 12, Nov. '44, pp. 504-508.
Best methods of organizing a welding shop and means of securing efficient control over production.

22-575. **Production-Line Brazing.** J. V. Kielb. *Welding Engineer,* v. 29, Dec. '44, pp. 35-38.
Gas brazing superior to arc welding for the fabrication of a certain propellerlike assembly used in a nose fuse; operators trained to arc welding were taught the use of torches.

22-576. **Cold-Weather Welding.** J. S. Wright. *Welding Engineer,* v. 29, Dec., '44, p. 39.
Shipyard welding used to stop when the thermometer fell to below 10° F. Now it can go on regardless of the temperature. Improper crystallization; pre-heating not enough.

22-577. **Welded Railroad Rails.** Clyde B. Clason. *Welding Engineer,* v. 29, Dec. '44, pp. 40-43.
Trend to the all-welded continuous rail is growing; how thermit welding was used to join the rails in Colorado's six-mile Moffat tunnel.

22-578. **Spot-Welded Parts for P-51s.** Gerald Eldridge Stedman. *Welding Engineer,* v. 29, Dec. '44, pp. 44-46.
North American Aviation has brought spot welding to a fine art by a planned progressive layout plus careful consideration of such details as overhead conveyors, plastic fixtures, chemical cleaning methods, standard machine settings, visual and metallurgical inspection.

22-579. **So This Is China.** Fred B. Barton. *Welding Engineer,* v. 29, Dec. '44, pp. 48-49.
Welding is indispensable to the 14th Air Force—the famous "Flying Tigers" of General C. L. Chennault.

22-580. **Notes on Fusion-Welded Boilers.** D. R. Carse. *Railway Age,* v. 117, Dec. 16, '44, pp. 925-926.
War Production Board investigates steel saved in the construction and repair of welded alloy steel locomotive boilers.

22-581. **Repair of Castings.** L. A. Danse. *Welding Journal,* v. 23, Dec. '44, pp. 1119-1123.
Procedures for performing the repair work.

22-582. **Adams Lecture—Solid-Phase Welding.** A. B. Kinzel. *Welding Journal,* v. 23, Dec. '44, pp. 1124-1144.
Complete interface elimination, as determined by the microscope, is the best scientific criterion of the worth of a pressure weld. The mechanism of pressure welding seems to comprise atom transfer across the interface to permit such crystallization. A hypothesis to the effect that the laws of diffusion apply to this atom transport appears both plausible and tenable although the necessary constants for an accurate check of the hypothesis are lacking. Experiments have shown the important role played by a phase change in effecting trans-interface bonding. This phenomenon as well as a similar effect provided by recrystallization may be thought of as increasing atom transport by virtue of an effectively increased diffusion constant.

22-583. **Oxy-acetylene Pressure Welding.** A. R. Lytle. *Welding Journal,* v. 23, Dec. '44, pp. 1145-1156.
Technical and mechanical aspects of oxy-acetylene pressure welding. The specimens are butted under nominal pressure, heated by means of multiple small oxy-acetylene flames to a temperature of about 1200° C. and upset to a controlled degree. Advantages of process. 2 ref.

22-584. **Metallic Arc Welding Electrodes.** Harold Lawrence. *Welding Journal,* v. 23, Dec. '44, pp. 1159-1168.
Nickel and nickel alloys; copper and copper alloys; aluminum electrodes.

22-585. **Welding Repair Jobs.** James Cable. *Welding Journal,* v. 23, Dec. '44, pp. 1169-1171.
Building up the bronze liners on tail shafts in way of the stern gland packing of several large vessels with electric arc welding.

22-586. **The Measurement of Energy Absorption in the Tee-Bend Test.** Leon C. Bibber and Julius Heuschkel. *Welding Journal,* v. 23, Dec. '44, pp. 609-S-631-S.
Apparatus and procedure, Navy; deformation energy in making the tee bend; appraisal of the measurement of energy absorption in bending welded specimens.

22-587. **Impact Strength of Arc-Welded Joints in Aircraft Steel.** H. O. Klinke. *Welding Journal,* v. 23, Dec. '44, pp. 633-S-634-S.
Alloy electrodes No. 1 and 2 have better weldability characteristics as compared to the E 6013 electrode, particularly as regards susceptibility to cracking; it may be desirable to use these electrodes for weldments subject to considerable restraint and rigidity.

22-588. **Discussion of Fatigue Studies of Weld Test Triangular Structures with N E 8630 Steel Tubing.** B. A. Kornhauser. *Welding Journal,* v. 23, Dec. '44, p. 635-S.
Value of post-treating the heat-affected weld zones of material specified to be normalized either locally or by heat treating the entire part. 6 ref.

22-589. **Buckling Prevented in Welded Aluminum Sheet.** *Iron Age,* v. 154, Dec. 21, '44, pp. 44-45.
On large work, controlled expansion in special jigs which hold the work flexible is being used in place of preheating, still retained on small work.

23. INDUSTRIAL USES AND APPLICATIONS

23-320. **Accurate Blanks Necessary to Produce Fine-Pitch Spur Gears.** Charles Bullen. *American Machinist,* v. 88, Nov. 23, '44, pp. 105-106.
Checking some seemingly obvious points in blanks and gears can prevent much waste of time and material spent in assembling intricate types of equipment.

23-321. **Mill Bearings.** H. L. Smith. *Iron & Steel,* v. 17, Nov. '44, pp. 680-681.
Use of lead-base babbitts containing arsenic.

23-322. **Light Alloys in Metal Rectifiers and Photocells.** *Light Metals,* v. 7, Nov. '44, pp. 525-529.
Apparatus, auxiliary materials and technique employed in preparing and handling alkali metals for photocells. Physical and chemical properties of these metals and methods for their extraction.

23-323. **The Lightness Factor in Post-War Road Transport.** *Light Metals,* v. 7, Nov. '44, pp. 530-536.
Economic and technical advantages of aluminum construction for commercial vehicles.

23-324. **Aluminum in the Chemical Industry.** *Light Metals,* v. 7, Nov. '44, pp. 537-551.
Application of light metals for specific purposes in chemical engineering. Suitability in plant for the production of various types of compound.

23-325. **Vulcanizing Rubber with Magnesium.** Wilfred Griffin. *Light Metal Age,* v. 2, Nov. '44, p. 29.
Powdered magnesium heating element. Primarily for use of magnesium in pelleted form in a tablet to vulcanize rubber inner tubes.

23-326. **Novel Method of Handling Bombs Increases Efficiency.** Alan B. Salkeld. *Steel Processing,* v. 30, Nov. '44, pp. 707-711.
Nose and tail forged by "wobblers"; flat drills used on bomb noses; stresses relieved; descaling, cleaning, painting.

23-327. **Civilian Requirements for Metals Receive Greater Consideration in Great Britain.** L. H. Tarring. *Metals,* v. 15, Nov. '44, pp. 16-17.
Metals needed for repair of buildings given high priority; no serious displacement of tin by substitutes anticipated.

23-328. **Industrial Applications of the Rare Earth Metals.** R. C. Vickery. *Metallurgia,* v. 30, Oct. '44, pp. 311-312.
Uses to which rare earth metals have been put either individually, as a group, or in their naturally occurring forms.

23-329. **National Emergency Steels for Heavy Naval Forgings.** William C. Stewart and Richard E. Wiley. *Metal Progress,* v. 46, Dec. '44, pp. 1258-1262.
Tests made on 12 steels of five NE grades, furnished in the form of 8-in. rounds, which indicate that NE 8630, 8740, 8745, and 9445 will meet requirements of the Navy's Class An for propulsion shafting and pinion gears, when normalized and properly tempered. NE 8745 can meet the more difficult requirements of Class HG.

23-330. **Metals for the Railroads.** *Railway Mechanical Engineer,* v. 118, Dec. '44, pp. 558-561, 563.
Study of metals a constant one for railroad engineers and designers—laboratory, shop and service findings all important. Railroad axles, by O. J. Horger; Metal limitations in the perfecting of motive power, by Paul Irwin; Incipient cracking in firebox and boiler steel, by Ray McBrian; Improving the railroad car bearing, by J. R. Jackson.

23-331. **Box Car Has Aluminum Sheathing.** *Railway Age,* v. 117, Dec. 9, '44, pp. 879-880, 887.
Great Northern's 50-ton steel-frame plywood-lined car utilized all-aluminum exterior to reduce the weight by 4057 lb.

23-332. **Uses of Tool Steel Tubing.** George Bissett. *Tool Engineer,* v. 14, Dec. '44, pp. 89-92.
Man-hours, machine time, and materials may be saved by substituting tubing for bar stock where rings or rolls are required in machine and tool engineering. Typically ingenious tooling applications are described.

23-333. **Unification of Bearings.** H. Tornebohm. *Steel,* v. 115, Dec. 11, '44, pp. 142, 144.
Standardization of boundary dimensions reduces number of styles, bringing new economies in production and maintenance. International classifications permit the immediate inclusion of new types of bearings.

23-334. **Tooling for Hydraulic Valve Production.** Gerald Eldridge Stedman. *Machine Tool Blue Book,* v. 40, Dec. '44, pp. 139, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160.
The Adel midget series of hydraulic selector valves.

23-335. **Coated Abrasive Belts Make War History.** Thomas Trowbridge. *Machine Tool Blue Book,* v. 40, Dec. '44, pp. 67-168, 170, 172, 174, 176, 178, 180, 182.
Use and applications.

23-336. **Ball and Roller Bearings.** L. Rosenfeld. *Automobile Engineer,* v. 34, Nov. '44, pp. 503-505.
Experiments carried out in calibrating the roller bearing friction of an apparatus for testing the friction of a plain bearing.

23-337. **Plastics in Tool, Jig and Fixture Construction.** E. E. Halls. *Plastics,* v. 8, Nov. '44, pp. 530-544.
Work of the Vega Aircraft Corporation. Plastic tools that withstand 8000 psi. under hydraulic presses. Plastic used is a phenolic resin, the filler material is the ordinary walnut shell finely pulverized, and the chief items of chemical plant involved are mixer and oven.

23-338. **No More Chain Gang.** G. W. McCollum. *Die Casting,* v. 2, Dec. '44, pp. 24-25.
Use of die casting makes possible an inexpensive electric hoist; opens new market.

23-339. **Little Power House.** Paul Maurer. *Die Casting,* v. 2, Dec. '44, pp. 29-30.
Postwar uses of die castings in electric motors and appliances.

23-340. **Die Cast Elements Actuate the Clutch.** A. H. Wehmeyer. *Die Casting,* v. 2, Dec. '44, pp. 32-34.
Clutch assembly.

23-341. **Special Applications for Tin Base Die Castings.** H. M. Fraser. *Die Casting,* v. 2, Dec. '44, pp. 41-43.
Tin base metal not an expensive material but several considerations recommend its use.

23-342. **"Know How" Gives Leak Proof Performance.** George E. Ford. *Die Casting,* v. 2, Dec. '44, pp. 46-47.
Use of die castings in producing bomb bay fuel tank gages.

23-343. **Thin Plate Method Speeds Mounting of Ball Bearings.** *American Machinist,* v. 88, Dec. 21, '44, p. 107.
Using Alclad steel plates only slightly thicker than the races, method developed which cuts rejects and makes bearings able to withstand thrust loads of greater amount.

23-344. **Meehanite Tool Castings.** *Tool and Die Journal,* v. 10, Dec. '44, pp. 100-101, 126.
Use of Meehanite cast metal as the base for carbide tipped cutting tools. History of this application.

24. DESIGN

24-59. **Stampings in Present Day Aircraft Production.** Ernest C. Morse. *Steel Processing,* v. 30, Nov. '44, pp. 712-713.
Advent of airplane mass production; savings in cost and materials; redesigning for press reduction; recognition of results from stampings.

24-60. **What a Designer Needs in Your Catalog.** E. A. Pinger. *Western Metals,* v. 2, Nov. '44, pp. 74, 76-78.
Designer looking for information to place on his drawing needs definite measurements and specifications, wants fundamentals pertinent to his need, such as dimensions and tolerances, materials and heat treat conditions, finish, definite part number, approval by government services, specifications.

24-61. **Designing Aluminum Forgings.** Stanley V. Malcuit. *Metals and Alloys,* v. 20, Nov. '44, pp. 1319-1326.
Principles of aluminum forging design and various design-detail recommendations for achieving highest quality aluminum forgings and for simplifying their production.

24-62. **Better Quality Aluminum and Magnesium Castings for Aircraft.** Robert E. Ward. American Foundrymen's Association *Transactions,* v. 52, Dec. '44, pp. 475-482.
Necessity of producing light metal aircraft castings of the quality and in the quantity demanded by the present emergency. Close coordination of the work of designers, engineers and foundrymen is given as the fundamental essential in high quality casting production. Principles of casting design.

24-63. **New Machine and Tool Design Speeds Aircraft Parts Output.** Gerald Eldridge Stedman. *Tool Engineer,* v. 14, Dec. '44, pp. 73-76.
From tool grinding to tube bending, fighting plane builder meets rising production schedules with manufacturing methods which require a minimum of space and skilled man-hours.

24-64. **Design Considerations for Square or Rectangular Wire Helical Springs.** A. M. Wahl. *Wire and Wire Products,* v. 19; Dec. '44, pp. 842-843.
Considerations involved in the design of helical tension or compression springs made of square or rectangular wire, with particular reference to the effect of curvature on stress and deflection.

24-65. **Thought for Fuel.** L. B. Harrington. *Die Casting,* v. 2, Dec. '44, pp. 22-23, 44-45.
Refinement in a die cast electric fuel pump. The engineers, profiting by the advantages of die casting in their previous models, make it do double duty in their designs for a heavier unit.

24-66. **A Simplified Solution to a Production Problem.** *Die Casting,* v. 2, Dec. '44, pp. 48-49.
Die vs. sand casting gun turret valves.

24-67. **Designing Aluminum Alloy Forgings.** L. W. Davis. *Machine Design,* v. 16, Dec. '44, pp. 111-116.
Limitations and possibilities of product.

25. MISCELLANEOUS

25-269. **Easily Made Compressed Air Cylinder Has Many Uses.** C. W. Hinman. *American Machinist,* v. 88, Nov. 23, '44, p. 101.
Low cost device provides holding pressures from 400 to 600 psi. when used with shop lines having 80 psi. pressure.

25-270. **3-Point Support for Assembly Fixtures.** *Steel,* v. 115, Nov. 27, '44, p. 90.
Principle of the three-legged milking stool is utilized in jig which does not depend upon a level floor for accuracy. A jig builder's transit is used to establish center lines and critical points.

25-271. **American-British-Canadian Screw Thread Standards Near.** *Iron Age,* v. 154, Nov. 30, '44, pp. 65-67.
Truncated Whitworth threads; high duty studs; pipe threads; screw threads for compressed gas cylinder outlets; Acme threads; Buttress threads; instrument threads; unification of screw threads; design and drafting practice; tool and screw thread production.

25-272. **Development in Production Riveting.** *Machinery* (London), v. 65, Oct. 26, '44, pp. 459-461.
Bucking devices made in various assemblies to suit both manual and automatic riveting operations. Each assembly consists of a floating bar, which is positioned against the shank end of the rivet, and two more spring-actuated reacting plungers or hammers which operate against the back of the bar in response to impulses which are imparted by air-driven riveting guns.

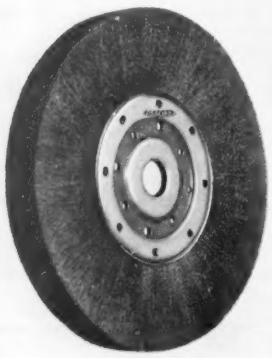
(Continued on Page 21)

NEW PRODUCTS IN REVIEW

POWER BRUSH

The Osborn Manufacturing Co.,
5401 Hamilton Ave., Cleveland, Ohio.

A new power brush for removing burrs, preparing metal surfaces and many other applications has been designated as the Monitor brush No. 1409-S-22. The new brush is especially well suited to aluminum, brass, and other ductile metals for removing burrs effectively without damaging adjacent surfaces of the part, and also will find extensive application on hardened and unhardened steel parts.



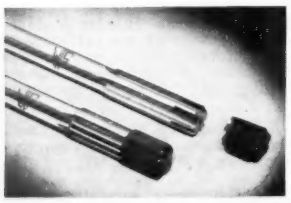
In the application for which it has been especially designed, the brush has a cutting rate four times as great and a brushing life three times longer than the best fine-wire brushes manufactured up to this time, according to laboratory and field tests conducted by the manufacturer.

Mention R720 When Writing or Using Reader Service.

PLASTIC COVERING FOR CARBIDE-TIPPED TOOLS

Wendt-Sonis Company, Hannibal, Mo.

Damage to carbide-tipped tools in transit should be considerably reduced by a new protective device now used by this company and applied to all its carbide-tipped tools. The protection consists of applying a strong plastic coating to each tool tip immediately after final inspection at the plant. This hard and durable covering remains in place until inspected by the purchaser and then it can be slipped back over the tool tip to make permanent protection in the tool bin. Although the covering is air and moisture-proof after initial application, it will not leave any gummy residue on the working surfaces when removed from the tip.



Mention R721 When Writing or Using Reader Service.

ARC TORCH FOR ELECTRIC WELDING

Mid-States Equipment Co.,
2429 S. Michigan Ave., Chicago 16, Ill.

A new torch, to be used in conjunction with electric arc welders, is announced under the trade-name 9000 Arc Torch. This torch provides an electric flame of intense heat, possibly 9000° F., without oxygen or other gas to contaminate the weld, and with no pressure to force molten metal away or to blow holes in light sections.

This torch can be used with any a.c. or d.c. electric welder for welding aluminum, brass, bronze, nickel silver, cast iron and other non-ferrous metals and alloys; for brazing steel, cast iron, malleable iron, copper and other ferrous and non-ferrous metals; for preheating all metals prior to welding; for soldering all ferrous and non-ferrous metals; for straightening and bending; and for hard surfacing where wear resisting metals are used. It is claimed that the new torch is more economical than a gas torch.

Mention R722 When Writing or Using Reader Service.

SPRING STEEL LOCK NUT

Adel Precision Products Corporation,
Burbank, California

This new spring steel, quick-fastening lock nut called Stalock offers 360 degree contact with screw threads. This all-around contact allows positive gripping action and at the same time conserves tension locking power, thus permitting re-use of the nut. When screw or bolt is tightened, the spring action of nut causes contact surfaces to be forced deeper into thread channels thus affording even greater locking action. Resulting tension prevents nut from loosening even under extreme vibration.

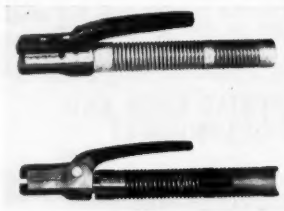
Tests show the fastener meets all demands of light assemblies with performance far exceeding AAF Specification No. 25533. Vibration requirements are exceeded by four times. A wide variety of fasteners are furnished for sheet metal screws and for coarse machine screws. Special shapes and sizes will be built.

Mention R723 When Writing or Using Reader Service.

ELECTRODE HOLDER

Pacific Engineering Corp.,
3123 San Fernando Rd., Los Angeles 41, Calif.

After use and development in its own shops, this company is now marketing the Mor-Weld, a new type of electrode holder. An innovation is the heat-resisting plastic jaw cover. This new jaw cover is said to give twenty to thirty times longer service. This longer use eliminates the necessity for constant changing and servicing of jaw covers, as well as handle covers. An additional economizer of time and money is flexibility which enables the welding rod to be consumed down to a mere stub without the necessity of bending. Grip holds all rod sizes. The handle, made of plastic, cannot come off by itself, which provides a needed safety feature. The holder also has been scientifically balanced for faster, easier work. It is said to keep cooler under continuous operation.



Mention R724 When Writing or Using Reader Service.

PLATING UPON ALUMINUM

The Enthone Company, 515 Elm Street, New Haven, Conn.

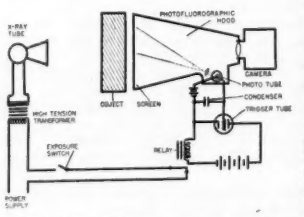
"Alumon" process for preparing aluminum for electroplating provides for electroplating of all types of aluminum. Both rack and bulk work can be readily processed. The procedure consists in cleaning in the usual manner, followed by a short dip in the "Alumon" solution, which produces an active alloy base which can be subsequently copper or silver plated. After the work has been given a short copper plate, it can then be electroplated with other metals including nickel, chromium, gold, etc. Work plated by this process can be subjected to severe distortion without flaking and the plate can be readily soldered thus permitting easy soldering to work made of aluminum. Literature is available describing the process in detail.

Mention R725 When Writing or Using Reader Service.

ELECTRONIC TIMING PROVIDES UNIFORM X-RAY EXPOSURES

Westinghouse Electric & Manufacturing Co.,
306 Fourth Avenue, Pittsburgh 30, Pa.

For the first time an electronic method controlling X-ray exposures has been developed, enabling radiologists and technicians to obtain uniformly dense photofluorographic exposures automatically, rapidly, and with an overall increase in operating efficiency of about 100 per cent, according to H. D. Moreland, Manager, X-Ray Engineering, at Westinghouse in Baltimore.



The photoelectric timer operates on the principle of the exposure timer which amateur photographers use. X-ray radiation, passing through an object, strikes a fluorescent screen and is converted into visible radiation. A section of the luminous screen is scanned by a photoelectric tube which in effect measures the light leaving the screen. When enough light has left the screen for the desired film exposure, the photoelectric timer actuates a relay, opening the X-ray circuit and terminating the exposure.

Although first used in medical radiography, the development will undoubtedly include industrial X-ray analysis. Objects such as castings, conducted on conveyors, can be inexpensively, quickly, and uniformly photographed on miniature roll film using the photoelectric control. Large, irregular objects need only be positioned before the screen. Since the photoelectric control responds to the actual light on the screen, deviations in the internal structure of the object X-rayed will not deceive the timer, and the result will be films of desired density, analytically satisfactory, attained with minimum cost.

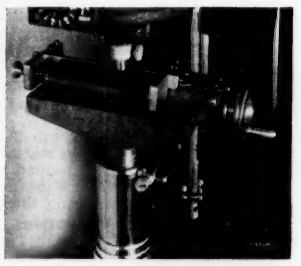
The schematic diagram reveals the ingenious simplicity of the photoelectric timer. Closing of the exposure switch energizes the X-ray tube and radiation passes through the object. Undesired, scattered radiations are filtered by a grid and the direct X-ray radiation strikes the fluorescent screen where it is converted into visible light radiation. The light is picked up by the photographic camera lens and by the phototube lens which scanned the representative section of the fluorescent screen, focusing the light on the photoelectric tube. The resulting current charges the condenser and when the proper potential is obtained the trigger tube fires actuating a relay which opens the circuit and terminates the exposure. The circuit is designed so that the timer maintains a constant exposure factor. Thus, if very dense objects are being photographed, the timer maintains the exposure a relatively longer time. Since the phototube sees precisely what the photographic camera sees, the timer functions independent of internal irregularities in the object providing uniform, quick exposures.

Mention R726 When Writing or Using Reader Service.

JOMINY FIXTURE

Precision Scientific Co.,
1750 N. Springfield Ave., Chicago 47, Ill.

This company is manufacturing a new indexing fixture for Jominy hardenability bars, developed in cooperation with J. T. Fergusson of Notre Dame University. This new fixture mounts readily on either the Clark or Wilson hardness testing machine.



It consists mainly of a heavy rigid base casting, indexing screw and a quick return mechanism. The plug which supports the fixture in the hardness tester is hardened and ground tool steel, projects upwards through the base casting, and forms the surface against which the diamond point presses against the Jominy bar. The screw operating the carriage back and forth is stainless steel and turned by means of a brass chrome-plated hand wheel. A bronze half-nut is fastened to a quick release lever engaging the screw.

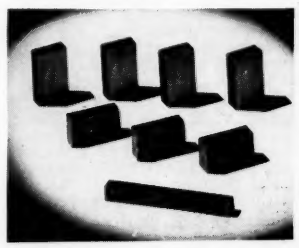
When the test bar has reached the end of its travel, the half-nut is released and the entire carriage slides back rapidly to the new starting position. An adjustable stop automatically provides the initial starting point on the test bar. A spring plunger holds the test bar into position and allows enough freedom for the bar to rest firmly on the hardened steel stud. Finished in black Kem-Resist, with chromium plated parts.

Mention R727 When Writing or Using Reader Service.

HARDSTEEL TOOL TIPS

Black Drill Company, Division of Black Industries,
Cleveland, Ohio.

This company is now supplying a line of tool tips made of Hardsteel and designed for brazing into steel shanks. Tools tipped with Hardsteel are said to possess several advantages. They are more economical in first cost. They are more easily and quickly reground on a standard wheel one or two grades softer than is necessary for high speed steel. They are easy to braze. They permit the making of tools that combine a strong tough shank with a cutting edge having the abrasion resisting qualities of the sintered carbides plus the shock resisting qualities of high speed steel. They are ideal for machining the harder and tougher steels and the abrasive copper and light metal alloys either rolled or cast. These tool bits are made in all standard sizes and are available from stock. Special sizes for unusual applications can also be supplied.



Mention R728 When Writing or Using Reader Service.

INSPECTION DEVICE

George Scherr Company,
200 Lafayette St., New York 12, N. Y.

This model "C" Magni-Ray has been developed to serve for all inspection work where it is necessary to observe a very wide field at one time. This new Magni-Ray is encased in a casting made of aluminum alloy for ease in transporting the housing by means of a handle to the work or for fastening to a machine tool to observe turning and grinding operations. The lens, which is 5 in. diameter, is manufactured of high-grade optical glass and gives a clear, undistorted vision of the object under inspection. The housing is fastened to the 16-in. upright rod extending from the base, by means of a universal clamping device, which permits swiveling both up and down and sideways. The magnifying device is supported by a triangular 12 x 12 x 12-in. cast iron base for rigidity and stability.

Each model is arranged with two 4-in. 25-watt tubular bulbs, especially silvered so that the light is reflected directly upon the work without any loss of power. The instrument is especially designed for use on large castings for the detection of cracks, imperfections and blow holes.

Mention R729 When Writing or Using Reader Service.

A.S.M. Review of Current Metal Literature — *Continued*

25. MISCELLANEOUS (*Cont.*)

25-273. **Economical Uses for Discarded Broken Tungsten-Carbide Tool Tips.** W. M. Halliday. *Metallurgia*, v. 30, Oct. '44, pp. 296-299.
Useful ways in which broken fragments of fractured carbide tool-tips may be utilized with great advantage. Broken tips may be used with a number of ordinary workshop tools, gaining the benefits of the high abrasive resistance of this material.

25-274. **The Coinage Metals in Antiquity, I.** Douglas Rennie Hudson. *Metallurgia*, v. 30, Oct. '44, pp. 313-320.
Historical development of gold, silver, bronze and electrum artefacts reviewed.

25-275. **Gas Turbines and Jet Propulsion.** *Canadian Metals and Metallurgical Industries*, v. 7, Nov. '44, pp. 44, 46.
Special advantages balance lower efficiencies.

25-276. **Model Construction.** A. J. Murphy. *Metal Progress*, v. 46, Dec. '44, p. 1275.
Methods for constructing space models.

25-277. **Short Cuts in Aircraft Production.** L. G. Smith. *Modern Machine Shop*, v. 17, Dec. '44, pp. 124-130.
"Ideas" that have been developed by Lockheed executives, engineers and employees to save time and material and step-up production.

25-278. **Rubber Tooling Aids Precision in Gun Plant.** Alfred Weiland. *Machinery*, v. 51, Dec. '44, pp. 148-155.
Rubber for guiding cutting tools and expanding holding devices in a naval ordnance plant where guns of highest quality are turned out on a production basis.

25-279. **Tabulated Data Speeds Balancing of Compressor Rotors.** Milton Hoeppner. *American Machinist*, v. 88, Dec. 7, '44, p. 97.
Dynamic balancing achieved by cutting away metal from one or more ribs inside rotor lobes to predetermined specifications.

25-280. **Indexing Templets Permit Accurate Riveting at High Speed.** R. M. Alexander. *American Machinist*, v. 88, Dec. 7, '44, pp. 109-110.
Photographs of master layouts serve as guides in preparing indexing templets. Savings in tooling are made by this means.

25-281. **Power Cylinder Functions.** John E. Hyler. *Machine Tool Blue Book*, v. 40, Dec. '44, pp. 235-236, 238, 240, 242, 244, 246, 248.
Hydraulic riveters have eliminated the noise and increased production efficiency from other standpoints.

25-282. **Manufacturing Shortcuts.** *Steel*, v. 115, Dec. 11, '44, pp. 126, 128, 130, 174.
West Coast company saves time, cuts costs with novel production methods involving machining, stamping, stretch-forming and swaging. Some machines designed and built in own shop.

25-283. **The Selection of Industrial Rubber Products.** Irwin H. Such. *Steel*, v. 115, Dec. 4, '44, pp. 112-115, 156, 159-160, 162, 164.
Five types of synthetics now being used in the manufacture of belting, hose, packing, linings, abrasive wheels and the like for the metalworking industries are proving satisfactory substitutes for natural rubber and have earned permanent place for many applications. Data presented on physical characteristics and types best suited for products.

25-284. **Diversified Manufacturing.** G. Eldridge Stedman. *Steel*, v. 115, Dec. 4, '44, pp. 120, 122, 124.
Heavy equipment of many types is produced at western plant specializing in construction from details of design to finished product.

25-285. **Covering Weatherproof Cable.** Robert M. Harbeck. *Wire and Wire Products*, v. 19, Dec. '44, pp. 837-840.
Covering solid wire concerned specifically with a new knitting process to manufacture weatherproof wire.

25-286. **Tube Turns Extends Forging Service to Aircraft and Automotive Fields.** Joseph Geschelin. *Automotive and Aviation Industries*, v. 91, Dec. 1, '44, pp. 20-23, 80, 82.
Facilities of Tube Turns, Inc., Louisville, Kentucky.

25-287. **Bearing Maintenance.** K. M. Glaesner. *Blast Furnace and Steel Plant*, v. 32, Dec. '44, pp. 1460-1461.
If maintenance of bearings is to be accomplished every effort must be taken to utilize the same quality control that is employed in the manufacture of new bearings. Facilities required are good lighting, filtered air, proper ventilation, and clean, well painted areas.

25-288. **Research Opens the Door.** Charles F. Kettering. *Scientific American*, v. 172, Jan. '45, pp. 7-12.
How industry has developed the philosophy of research, changing the picture from that of the lone inventor struggling against tremendous odds to the broad teamwork programs of today. Present applications of industrial research point the way toward solving some of tomorrow's important problems.

25-289. **Better Metals Through Research.** Fred P. Peters. *Scientific American*, v. 172, Jan. '45, pp. 13-15.
Outstanding war-time research-in-metals development is the sharing of data and efforts by manufacturers. The inevitable result is better materials and methods for peace-time products. These will be converted into applications of importance to industry and the public alike.

25-290. **Railways Roll on Research.** C. B. Peck. *Scientific American*, v. 172, Jan. '45, pp. 16-18.
Many problems became the subjects of research early in the history of the industry. Some of these have been under almost continuous investigation since. Practically no industry employing research in the development of its products has not made its contribution to the railways.

26. STATISTICS

26-112. **Mercury Poses Difficult Post-War Problem for United States Government and Industry.** *Metals*, v. 15, Nov. '44, pp. 10-13.
Metals reserve stockpile equal to 3 years' peacetime needs; home consumption expected to decline drastically; Spanish and Italian producers will seek to dominate world markets.

26-113. **Copper and Zinc Restrictions Eased Owing to Ample Supply — Lead Situation Tighter.** *Metals*, v. 15, Nov. '44, pp. 18-20, 28.
Consumers more inventory conscious and eating into reserve except in lead—little change noted in metal consumption.

26-114. **The Raw Material Foundation of Western Industry.** J. R. Mahoney. *Western Metals*, v. 2, Nov. '44, pp. 27, 29.
Activity percentages; agricultural raw materials; industries based on lumber; determining factors; iron ore deposits; aluminum and magnesium; nitrate products; western non-metallics.

26-115. **American Tin Supplies and Wartime Consumption.** Erwin Vogelsang. *Metal Progress*, v. 46, Dec. '44, pp. 1243-1247.
Our dwindling stockpile cannot eke out the emergency if we relax our efforts in conservation and scrap collection.

26-116. **The Light Metals and the Steel Business.** L. S. Hamaker. *Blast Furnace and Steel Plant*, v. 32, Dec. '44, pp. 1463-1464.
Aluminum versus steel post-war outlook; plastic market possibilities.

27. NEW BOOKS

27-163. **Der Kampf des Ingenieurs gegen Erde und Wasser im Grundbau.** Arnold Agatz. 276 pp., illus. J. W. Edwards, Ann Arbor, Mich. $9.25.

27-164. **Mikro-Massanalytische Bestimmung des Kohlenstoffes und Wasserstoffes mit grundlegender Behandlung der Fehlerquellen in der Elementaranalyse.** Josef Lindner. 347 pp., illus., J. W. Edwards, Ann Arbor, Mich. $7.15.

27-165. **Eisenlose Drosselspulen; mit einem Anhang uber Hochfrequenz-Massekernspulen.** Joseph Hak. 316 pp., illus., J. W. Edwards, Ann Arbor, Mich. $9.20.

27-166. **Glas.** Hermann Thiene. 2 v. 1120 pp., illus., J. W. Edwards, Ann Arbor, Mich. $28.25.

27-167. **Hochspannungstechnik.** Arnold Roth. 2nd ed., 624 pp., illus., J. W. Edwards, Ann Arbor, Mich. $15.60.

27-168. **Elektronenröhren als Anfansstufenverstarker.** Horst Rothe and W. Kleen. 303 pp. illus., (Bücherei der Hochfrequenztechnik). J. W. Edwards, Ann Arbor, Mich. $8.60.

27-169. **Elektronenröhren als Eng und Sendverstarker.** 141 pp., illus. (Bücherei der Hochfrequenztechnik) J. W. Edwards, Ann Arbor, Mich. $4.50.

27-170. **Handbuch der Metallbeizerei; Nichteisenmetalle.** Otto Vogel. 262 pp., illus. J. W. Edwards, Ann Arbor, Mich. $10.50.

27-171. **Die Knickfestigkeit von Staben und Stabwerken.** Julius Ratzersdorfer. 321 pp., illus. J. W. Edwards, Ann Arbor, Mich. $8.80.

27-172. **Allgemeine und Technische Elektrometallurgie.** Robert Müller. 380 pp., illus., J. W. Edwards, Ann Arbor, Mich. $11.00.

27-173. **Elektrolyt - Kondensatoren; ihre Entwicklung, wissenschaftliche Grundlage, Herstellung, Messung und Verwendung.** A. Güntherschulze and H. Betz. 178 pp., illus., J. W. Edwards, Ann Arbor, Mich. $6.00.

27-174. **Die Federn, ihre Gestaltung und Berechnung.** Siegfried Gross and Ernst Lehr. 136 pp., illus., J. W. Edwards, Ann Arbor, Mich. $4.75.

27-175. **Die Regelung der Kraftmaschinen unter besonderer Berucksichtigung der selbsttatigen Wasserturbinen regalung.** Gustav Fabritz. 392 pp., illus., J. W. Edwards, Ann Arbor, Mich. $13.00.

27-176. **Elastizitat und Festigkeit im Rohrleitungsbau.** Helmut von Jürgensonn. 353 pp., illus., J. W. Edwards, Ann Arbor, Mich $9.55.

27-177. **Metallographie des Magnesiums and Seiner Technischen Legierungen.** Walter Bulian and E. Fahrenhorst. 108 pp., illus. (Reine und angewandte Metallkunde in Einzeldarstellungen, v. 8.), J. W. Edwards, Ann Arbor, Mich. $4.75.

27-178. **La Filtration Industrielle.** George Genin. 446 pp., illus., J. W. Edwards, Ann Arbor, Mich. $16.00.

27-179. **International Tables for the Determination of Crystal Structures.** 2 vol., rev. ed., 696 pp., illus., J. W. Edwards, Ann Arbor, Mich. $18.85.

27-180. **High-Speed Combustion Engines; Design; Production; Tests.** Peter Martin Heldt. 12th ed. of the Gasoline Motor. 782 pp., illus., diagrs., Nyack, New York. $7.50.

27-181. **Mathematics.** John William Breneman. 2nd ed., 236 pp., diagr., (Penn. State College Industrial Series.) McGraw-Hill Book Co., 330 W. 42nd St., New York. $1.75.
The revised edition includes additional problems.

27-182. **A Manual of Blueprint Reading.** Carl Lars Svensen and William Ezra Street. 98 pp., illus., Van Nostrand, New York. $1.90.

27-183. **Rocket Research; History and Handbook.** Constantin Paul Lent. 102 pp., illus., diagrs., Pen-Ink Publishing Co., 130 W. 43rd St., New York. $5.00.
An engineer and industrial designer, vice-president of the American Rocket Society, explains rocket theory, with illustrations, formulas, tables, and records of actual experiments.

27-184. **The Biographical Directory of American Men of Science.** Jaques Cattell. 7th ed., 2033 pp. Science Press, Lancaster, Pa. $14.00.

27-185. **Simplified Time Study for Factory Supervisors, Shop Stewards and Cost Men.** Herbert J. Myers. 148 pp., illus., Ronald Press, New York. $2.50.
Sufficient information on procedure and records to enable anyone to check or make a stop watch time study of an operation as it is actually being performed.

27-186. **Diving, Cutting, and Welding in Underwater Salvage Operations.** Frank E. Thompson, Jr. 221 pp., illus., diagrs., Cornell Maritime Press, New York. $2.00.
A full presentation of where, when, and how to use equipment for underwater salvaging. Procedure for oxy-hydrogen and oxygen arc cutting, and for electric arc welding under water.

27-187. **Theory and Applications of Electron Tubes.** Herbert J. Reich. 2nd ed., 716 pp., illus., McGraw-Hill Book Co., 330 West 42nd St., New York. $5.00.
Fundamental principles of electron tubes, with a view to their application in radio engineering, industrial electronics, power control, and electric measurement. New developments incorporated.

27-188. **The Industrial Supervisor; a Training Guide for Improvement of Skill and Leadership.** John M. Amiss and Traver C. Sutton. 243 pp., illus., Ronald Press, New York. $3.00.
A practical discussion of subjects which constitute background knowledge for a departmental manager's attitudes and methods.

27-189. **Commercial Waxes.** H. Bennett. Chemical Publishing Co., Inc., 26 Court St., Brooklyn, N. Y. $11.00.
Data on all classes of natural and synthetic waxes and wax-like materials—properties, sources and uses, handling and compounding. Formulas of commercial materials containing waxes such as adhesives, materials of construction, protective and decorative coatings, etc.

27-190. **New Encyclopedia of Machine Shop Practice.** George W. Barnwell. 576 pp., 1000 illus., Wm. H. Wise & Co., Inc., 50 West 47th St., New York 19. $2.98.
A practical ready reference library and self-teaching home reading course. Describes and illustrates basic machine shop operations. Practical instructions for difficult problems.

27-191. **Procedures in Experimental Physics.** John Strong, H. Victor Neher, Albert E. Whitford, C. Hawley Cartwright, and Robert Hayward. 642 pp., illus., Prentice-Hall, Inc., 70 Fifth Ave., New York 11. $6.65.
Easy to follow explanations, 400 illustrations of exceptional clarity and completeness of labels, and as much theoretical material as needed. Fifteen chapters on technique of high vacuum, Geiger counters, coating of surfaces, optics, materials of research, heat and high temperature, etc.

27-192. **McGraw-Hill Conversion Tables.** Reprinted from Mechanical Engineers' Handbook, by Lionel F. Marks. 12 pp., McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18. $0.10.
Conversion factors from U. S. system to metric system for length, area, volume and capacity, mass, pressure, energy or work, density, etc.

27-193. **Arc Welding Engineering and Production Control.** Walter J. Brooking. 345 pp., illus., McGraw-Hill Book Co., 330 West 42nd St., New York 18. $4.00.
A manual of the arc welding process as applied in manufacturing and fabrication, drawing largely on typical industrial experience for a helpful blend of the shop skills and technical know-how required by operators, inspectors, engineers, and others concerned with the use of the process.

27-194. **Metallurgical Analysis by Means of the Spekker Absorptiometer.** F. W. Haywood and A. A. R. Wood. 128 pp., illus., Adam Hilger, Ltd., 98 St. Pancras Way, Camden Rd., London, N.W.I., England. 18s, 0d.
Details of some 26 commonly required metallurgical analyses using the Spekker photo-electric absorptiometer and very rapid and accurate absorptiometric methods that experience has proved to be well suited to routine use in control laboratories.

27-195. **Sheet Metal Theory and Practice.** John C. Butler. 173 pp., 8½ x 11, illus., John Wiley and Sons, Inc., New York. $3.00.
A concise, practical, tested, self-instruction guide giving methods of handling successfully tools and machines, material allowances, blueprint reading, soldering and fluxes, welded and riveted assembly, used in today's sheet metal shop practice.

27-196. **Aids to Technical Writing.** Richard C. Jordan and Marion J. Edwards. 117 pp., Bulletin No. 21, University of Minnesota, Engineering Experiment Station, Minneapolis. $0.50.
Planning and style; preparation of manuscripts; bibliography, footnotes, equations, tables; drawings, lantern slides, photographs; conversion factors and letter symbols.

27-197. **The Book of Pottery and Porcelain.** Warren E. Cox. 2 vol., 1174 pp., illus. (Lothrop, Lee and Shepard publication.) Crown Publishing Co., New York. $10.00.
A comprehensive, profusely illustrated guide to the history, technique of manufacture and development of china, pottery and porcelain in all parts of the world, including tables of marks.

27-198. **Machine Drawing Problems.** Edward Berg and George Elleson. Rev. ed., 150 pp., illus., diagrs., Manual Arts Press, Peoria, Ill. $1.96; paper $1.24.

Meehanite Institute Elects Officers

About 200 representatives of the member foundries of the Meehanite Research Institute of America, Inc., New Rochelle, N. Y., attended the 16th Annual Meeting held Nov. 1-3.

Oliver Smalley, Meehanite Metal Corp., New Rochelle, N. Y., was re-elected president of the Institute; H. B. Hanley of American Laundry Machinery Co., first vice-president; A. C. Denison of Fulton Foundry and Machine Co., second vice-president; and C. S. Nichols, Meehanite Metal Corp., secretary-treasurer.

Sterling Alloys Appoints Three Field Engineers

Sterling Alloys, Inc., has appointed three new field engineers for the sale of heat and corrosion resistant alloy castings. John Sonnenfeld, 206 N. 7th St., Keokuk, Iowa, will handle the state of Missouri, western Iowa, southern Illinois, Kansas and Nebraska. A. C. Wooley, Terminal Sales Bldg., Portland, Ore., will handle the states of Oregon and Washington. G. Dell, 314 W. Bloom St., Louisville, Ky., will handle the states of Kentucky and southern Indiana, including Evansville.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Birmingham District	Feb. 20	.....	J. E. Flaherty	Aluminum Alloys
Boston	Feb. 2	Hotel Sheraton	K. R. Van Horn	Application of Aluminum Castings and Wrought Alloys
British Columbia	Feb. 14	Brock Memorial Bldg., Univ. of B. C.	.....	.....
Buffalo	Feb.	.....	O. W. McMullen	Fundamentals of Metallography in Shop Practice
Calumet	Feb. 13	Phil Smidt's, Hammond, Ind.	A. E. Focke	National Officers Night
Chicago	Feb. 8	Chicago Bar Association	H. A. Schwartz	Malleable Iron and Its Modifications
Cincinnati	Feb. 8	Engineering Society	Hans Ernst	Recent Developments in High Speed Milling
Cleveland	Feb. 5	Cleveland Club	K. R. Van Horn	Metallurgy of the Aluminum Alloys
Columbus	Feb. 13	Fort Hayes Hotel	J. C. Fox	Die Castings
Dayton	Feb. 14	Engineers Club	G. O. Hoglund	Joining the Aluminum Alloys
Detroit	Feb. 12	Rackham Bldg.	K. R. Van Horn	X-Rays in Industry
Fort Wayne	Feb. 27	Chamber of Commerce	Russell Franks	Stainless Steel
Georgia	Feb. 5	Duchess Coffee Shop	E. W. Stewart	Springs and Spring Materials
Hartford	Feb. 13	Hartford Electric Light Co.	Ralph Leo	Cold Heading
Indianapolis	Feb. 19	Y. W. C. A.	H. B. Osborn, Jr.	Induction Hardening
Kansas City	Feb. 28	Nelson Art Gallery	John A. Koch	Interdependence of Tool Steels in Quantity Production Tooling
Lehigh Valley	Feb. 2	Hotel Bethlehem	S. L. Hoyt	Weldments and Their Competitors
Los Angeles	Feb. 22	Scully's Cafe	E. S. Davenport	The Interrupted Quench
Mahoning Valley	Feb. 13	Dinner Bell, Youngstown, Ohio	B. F. Shepherd	Martempering
Manitoba	Feb. 8	Marlborough Hotel	H. J. Noble	Metallurgical Approaches to Problems in Manufacturing Aircraft Engines
Milwaukee	Feb. 20	Milwaukee Athletic Club	.....	.....
Montreal	Feb. 5	Queen's Hotel	Peter Blackwood	Centrifugal Casting and Its Kindred Arts in 20th Century Foundry Practice
Muncie	Feb. 14	.....	Blaine B. Wescott	Industrial Oils and Oil Quenching
New Haven	Feb. 22	Derby Gas & Electric Co., Derby, Conn.	H. J. MacKenzie	Centrifugal Castings
New Jersey	Feb. 19	Essex House, Newark	V. N. Krivobok	Metallurgy in Engineering Design
New York	Feb. 5	2 Park Ave., 26th Floor	J. O. Almen	Processing to Improve Fatigue Life
North Texas	Feb. 21	Baker Hotel, Dallas	E. L. Hemingway	Super-Finishes
North West	Feb. 1	University of Minn.	A. P. Seasholtz	Martempering
North West	Feb. 15	University of Minn.	R. B. Seger	Practical Heat Treatment of Steel
Notre Dame	Feb. 14	Engineering Audit., Univ. of Notre Dame	C. K. Donoho	Centrifugal Castings
Ontario	Feb. 2	Royal Connaught Hotel, Hamilton	.....	.....
Oregon	Feb. 9	.....	A. G. Zima	Heat and Corrosion Resistant Cast Irons
Philadelphia	Feb. 23	Franklin Institute	A. R. Troiano	The S-Curve and the Heat Treatment of Steel
Puget Sound	Feb. 21	Washington Athletic Club	P. H. Fox	.....
Pittsburgh	Feb. 8	Roosevelt Hotel	K. R. Van Horn	Age Hardening of Metals
Rhode Island	Feb. 7	.....	J. O. Almen	Effect of Residual Stress on the Fatigue Strength of Structural Materials
Rochester	Feb. 12	Chamber of Commerce	V. N. Krivobok and Frank LaQue	Corrosion in Action
Rockford	Feb. 19	.....	J. H. VanDeventer	Joint Meeting, Rockford Engineering Societies
Rocky Mtn.				
Pueblo	Feb. 15	Vail Hotel	A. J. Langhammer	Powdered Metals
Denver	Feb. 16	Oxford Hotel	A. J. Langhammer	Powdered Metals
Saginaw Valley	Feb. 13	Fischer's Hotel, Frankenmuth, Mich.	S. L. Hoyt	Evaluation of Materials
Springfield	Feb. 19	Hotel Sheraton	H. W. Webber	Brazing in Controlled Athmospheres
Syracuse	Feb. 6	.....	Howard Roberts	Sub-Zero Treatment of Steels
Texas	Feb. 22	Texas State Hotel, Houston	B. B. Wescott	Corrosion Fatigue of Steels
Toledo Group	Feb. 28	Toledo Yacht Club	A. Allan Bates	Plastics vs. Metals
Tri-City	Feb. 13	Hotel Ft. Armstrong, Rock Island, Ill.	A. A. Hoffman and J. M. Birdsong	Prediction of Engineering Properties from Cold Finishing Methods
Warren	Feb. 8	IOOF Hall	F. W. Whitcomb	Cold Treating of Metals
Washington	Feb. 12	Dodge Hotel	N. E. Woldman	Aircraft Metallurgy
West Michigan	Feb. 19	Rowe Hotel, Grand Rapids	J. O. Almen	Correlation of Laboratory Tests with Performance in Service
Worcester	Feb. 14	Hotel Sheraton	F. G. Tatnall	Mechanical Testing
York	Feb. 14	West York Inn	Wesley S. Larson	Plastics Versus Metals

CALENDAR OF OTHER MEETINGS

Feb. 8-9—American Society of Lubrication Engineers. National Convention, Stevens Hotel, Chicago. (Headquarters 135 S. La Salle St., Chicago 3.)

Feb. 14-16—American Management Association. Personnel Conference, Palmer House, Chicago. (Association Headquarters: 330 West 42nd St., New York.)

Feb. 26-March 2—American Society for Testing Materials. Committee Week, Hotel William Penn, Pittsburgh. (Robert J. Painter, Assistant to the Secretary, 260 South Broad St., Philadelphia 2, Pa.)

Feb. 28—American Society for Testing Materials. Spring Meeting, Hotel William Penn, Pittsburgh.

A. I. E. M. Cancels February Meeting

To conform with the urgent request published in the press on Jan. 6 to curtail conventions and meetings, the Board of Directors of the American Institute of Mining and Metallurgical Engineers has cancelled its 162nd General Meeting of the Institute scheduled for New York City, Feb. 19-22, 1945. The more than 300 technical papers that were to have been presented at this meeting will be made available as rapidly as possible to the members of the Institute by means of the various publications of the A.I.M.E.

Frank Hodson Is Technical Advisor in Colombia

Frank Hodson, formerly metallurgist to the Board of Economic Warfare, Washington, and metallurgical representative on the 1943 United States Technical Mission to Brazil, has finished his 18 months' work as technical advisor to the Brazilian Government and will take a position as chief technical advisor to the Instituto de Fomento Industrial, Bogota, Colombia. This is a semi-Government organization responsible for new industrial developments in that country, including immediate work on a large new hydro-electric installation, new steel plant, chemical plants, etc.

Major Staples Overseas on Special Mission

Major Elton E. Staples, on leave from the Hevi Duty Electric Co., with whom he was Chicago district manager, has been sent overseas on a special mission. For nearly three years he has been stationed at Fort Monroe, Va.

Cook Electric Co. Acquires MetalFusion Corp. of America

MetalFusion Corp. of America has become a subsidiary of Cook Electric Co., Chicago, according to announcement by Walter C. Hasselhorn, Cook president.

The acquisition brings to Cook Electric Co. a critically controlled atmosphere brazing plant to process its own products. In addition to its modern welding department, the MetalFusion Corp. also has a fully equipped metallurgical laboratory for testing and analyzing metals.

William A. Ziebell has been appointed manager of the MetalFusion Corp. He has been acting as director of purchasing for Cook and formerly was purchasing agent for Schweitzer and Conrad, Inc.

Clifton Cargile is plant superintendent of the brazing and heat treating plant; he was formerly superintendent of the heat treating department for George E. Failing Heat Treating Co. of Wichita, Kansas. William S. Love is chief metallurgist for the MetalFusion Corp. He was formerly with the Kellogg Switchboard and Supply Co. and the Robert W. Hunt Co.

X-Rays Inspect Plane Parts

How the multitude of X-ray inspections have contributed to our fighting planes was told the Inland Empire Chapter, American Society for Metals, at a recent meeting.

Robert Taylor, who has worked in the inspection divisions of a number of plants and at the light metal foundry at Washington State college, told of the importance of X-ray inspection of metal castings. J. G. McGivern of Gonzaga presided.

H. F. Moore Retires From Active Teaching

H. F. Moore has retired as professor of engineering materials at the University of Illinois, and is now professor emeritus. He still makes his headquarters at Urbana, Ill., where he is engaged in some special war-work testing and in some special studies in the field of fatigue of metals.

NEW PRODUCTS

IDENTOMETER PRESENTS ELECTRONIC TIMING CONTROL

Dravo Corporation,
300 Penn Avenue, Pittsburgh 22, Penna.

Electronic timing control on the new Identometer eliminates the human factor in timing tests for positive identification of rolled or forged ferrous alloys and speeds up the work to a point where it is possible to keep pace with assembly line speeds. The function of Identometer is to identify steel for stocking or processing. This is accomplished by providing a known sample against which the unknown pieces are checked quickly by the instrument.

The Identometer utilizes the principle of thermo-electricity. All metals and alloys, with the exception of pure lead, exhibit thermo-electric effects to varying degrees. When two metals or alloys are brought in contact with each other and the point of contact is heated, there will be a small current generated, the magnitude of which will depend upon the difference in materials and the temperature to which the contact is heated. If the two materials are identical, there will be no current generated. By placing two samples in contact and heating the contact by passing a current through the pieces, the thermo-electric current generated can be measured. This is the principle of operation of the Identometer.

When the new model is properly set up, the power control, the zero adjustment, and the proper test are determined by a pilot test before the instrument and the stock to be tested are turned over to the less experienced operator. To accomplish a series of tests on similar units this procedure is followed: The Identometer power dial (left) is set at the proper volume, the zero adjustment (right) receives its proper setting, and the time interval knob (center) is placed on the interval that has been determined by the pilot test for this particular operation. From that point on, all the operator has to do is snap the impulse switch, the lowest device on the dial, and the test is not only set in motion but maintained there for the correct test interval.

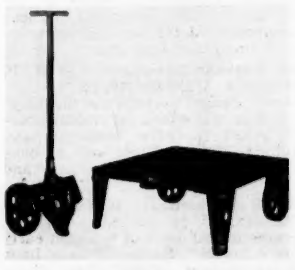
So that the operator may know the process and completion of each test, the entire reading scale (top center) illuminates as soon as the impulse switch is moved and remains fully illuminated until the prescribed test is completed. At that time the full illumination vanishes and a small disc of light appears just behind the reading test, a signal to the operator that this one test has been completed and it is now time to take the reading and attach material for the next test. While this instrument is distributed by Dravo, it is manufactured by American Tubular Elevator Company, Instrument Division.

Mention R730 When Writing or Using Reader Service.

4-WAY FLOOR PLATE DECK

Factory Service Co.,
4615 North Twenty-first St., Milwaukee 9, Wis.

Application of 4-Way Floor Plate to the standard Turner Transport Chassis increases considerably the various uses of this unit of the Turner System of materials handling.



The floor plate is welded flush with the top of the chassis on the angles of the frame. It is reinforced on the under side by two heavy angles. The non-skid feature keeps metal parts from walking off easily when the transport is in motion. Further, the embossments provide point contact with hot materials which allows some air space between them and the steel deck. Warping of the steel deck is thereby eliminated.

The transport is the foundational unit upon which the entire Turner System is based. It can be moved in restricted space by the hand jimmy, power lift truck, crane, tractor or conveyor. With Turner piling stakes, the load may be expanded vertically to any practical height. Steel or wooden bin sections and section trays also interlock one on another on top of this transport, thus making always available bins as high or low as the particular job requires.

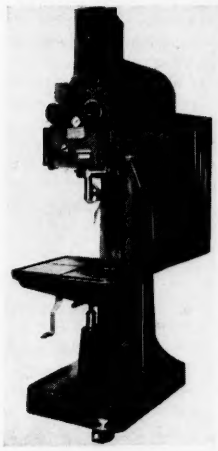
Mention R731 When Writing or Using Reader Service.

NEW PRODUCTS IN REVIEW

TAPPING AND THREADING MACHINE

Cleveland Tapping Machine Co.,
1725 Superior Avenue, Cleveland 14, Ohio

This tapping and threading machine is lead screw controlled at all times, yet has rapid approach and retraction of the spindle. It is so constructed that the lead screw assembly is never disengaged from the spindle. The entire lead screw assembly slides in scraped ways; it has a specially designed locking device that is so accurate that it can release and then again re-engage the lead screw assembly many times. The tap can be passed through the same hole again and again, yet the work piece will retain the same class fit of thread as when the tap was passed through the work piece originally.



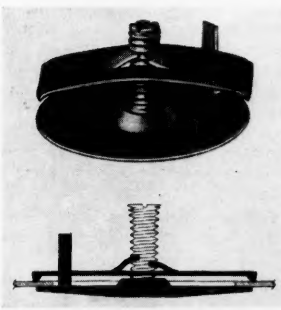
The rapid approach and retraction of the spindle is controlled by two air cylinders which exert no air pressure on the spindle when tapping. The rapid approach can be set to stop within 0.010 in. of the hole to be tapped. The rapid retraction becomes effective the instant the tap leaves the work. The tap is removed at twice the tapping speed. These factors make it possible to tap as high as 2,000 holes per hour. The reversing mechanism is mounted on the drive shaft and not on the tapping spindle. It is actuated by means of two opposed bi-metallic clutches, one operating the forward or tapping cycle, the other operating the reversing cycle. Its action is so positive that the vertical travel of the spindle is controlled to within 0.005-in. limits and the rotation of the spindle is held to one-tenth of a revolution. This makes the machine especially adapted for blind hole tapping. Infinite speed is possible within the range from 40 to 400 r.p.m. but higher ranges can be supplied.

Mention R732 When Writing or Using Reader Service.

NEW COVER PLATES

Tinnerman Products, Inc.,
2026 Fulton Road, Cleveland 13, Ohio.

These new speed nut cover plates were first designed for patching bullet holes in airplanes. Now their industrial applications include removable covers for inspection doors, access holes and vent holes. They are also used to seal up holes left after alterations or removal of equipment.

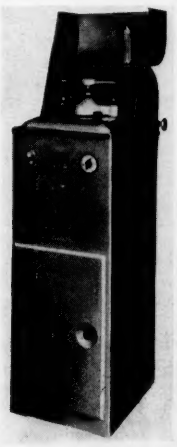


They are easily attached from one side by sliding one end of the speed nut into the hole, centering the cover plate over the hole and tightening the screw. The turned-down tab on the cover plate prevents the speed nut from turning while the screw is tightened. To remove, just loosen the screw and slip the speed nut out of the hole. Three sizes are available to fit a wide range of panel thicknesses and to cover holes $\frac{3}{8}$, $1\frac{1}{8}$ and $1\frac{3}{8}$ diameter.

Mention R733 When Writing or Using Reader Service.

SPECIMEN MOUNTING PRESS

Precision Scientific Co.,
1750 N. Springfield Ave., Chicago 47, Ill.



This semi-automatic air operated specimen mounting press is said to be radically new in design. Utilizing air for operation, which is automatically set by a constant pressure reducing valve, it eliminates the hand operated hydraulic jack found in other types of mounting presses to maintain pressure on specimens while curing.

This feature assures uniform specimens identical in size and hardness, improves polishing characteristics, and greatly reduces the operator's time. Bulletin 850 describes the complete line of metallurgical equipment offered by this company.

Mention R734 When Writing

DEGREASING MADE FIRE-SAFE BY CARBON DIOXIDE

Walter Kidde and Company, Inc., 675 Main, Belleville, N. J.

This company has devised built-in fire protection systems for many types of automatic washing machines. Carbon dioxide is used as the lightning-quick extinguishing agent. Varying in design with the dimensions and type of washing machine, these Kidde high pressure systems, specially engineered to fit particular needs, all operate on the same underlying principle—the rapid discharge of a large volume of carbon dioxide which, surrounding the flame, immediately reduces the oxygen content of the air to a point at which fire cannot exist. Carbon dioxide is sure death to all fires resulting from a combustion of any cleaning solvent employed in the degreasing process.

The washing machine illustrated has a built-in system. The conical nozzles carry high pressure carbon dioxide to the inside of the machine the moment any flame appears. Parts placed on the mesh conveyor are given two baths and a rinse and appear degreased and dried at the unload end of the washer.

The carbon dioxide has no deteriorating effect upon anything it touches. Operating as it does on motive power supplied by the expansion of the liquefied gas, the fire protection system is not dependent upon any outside source of energy, mechanical or electrical. Unfailing and uniform performance is thus assured independent of power facilities supplying the factory. Since carbon dioxide is an inert gas, there is no danger of deterioration or corrosion in any part of the fire fighting system.

Mention R735 When Writing or Using Reader Service.

"ALDECOR" STEEL

Alloys Development Company, Pittsburgh, Pa.

Carnegie-Illinois Steel Corporation and other subsidiaries of United States Steel, Republic Steel Corporation, and Lukens Steel Company have been licensed by this company to manufacture "Aldecor," a steel of the "Cor-Ten" type. This new steel has been successfully applied and tested in box car ends and miscellaneous parts for railroad freight cars, mine cars, and other similar structures. It is understood to have excellent forming and welding properties, as well as a substantial degree of atmospheric corrosion resistance.

Mention R736 When Writing or Using Reader Service.

FORK TRUCK CUTS FOUNDRY'S OVEN LOADING TIME IN HALF

Clark Tructractor Div., Clark Equipment Co.,
Battle Creek, Mich.

The Milwaukee Malleable and Grey Iron Foundry Company now uses a standard fork truck of 4,000 lb. capacity to load and unload an annealing oven in less than half the time formerly required by a steam powered oven charger.

Handling annealing pots is a problem common to all malleable iron foundry operators, with the pots to be stacked four deep, six abreast across the oven from end to end. Ceiling height at the sides is 70 in. and the floor is covered with sand and dirt. Also in the oven illustrated, there is the problem of tile flues on the floor. Formerly this charging and discharging operation was accomplished by a steam powered, steel wheeled, rear end controlled oven charger. Use of this equipment required that the operator arrive two hours before the machine was to be used, to fire up and get up steam. Loss of steam during charging or discharging as well as the low speed of the truck made each of these operations a four to five-hour job. The speed of the truck and the inconvenience of the rear end control compelled the driver to remain in the end of the oven picking up the last two rows of pots for ten to fifteen seconds in 600° heat on each trip.

After careful study of the operation, a gasoline powered fork truck of 4,000 lb. capacity and a low overall height, controlled by the operator seated in the center of the machine directly behind the load, was selected. This solution quickly proved to be an exceedingly good one. The operator was protected from direct heat from the pots by a steel sheet mounted behind the forks; the low overall height permitted operation against the oven side walls; the driver's position near the load gave quicker and more positive control of operation; and the speed of the vehicle kept the operator's time in the oven at a minimum. Thus charging and discharging time was cut from a four to five-hour job to one of approximately one and one-half hours. Obviously this change also cut out the time formerly spent firing and preparing for operation. Management benefits from the increased efficiency of this operation and the operator enjoys improved working conditions.

Mention R737 When Writing or Using Reader Service.

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MANUFACTURERS' CATALOGS IN REVIEW

Straightening Presses

Colonial Broach Company,
P.O. Box 37, Harper Station, Detroit 13, Mich.

A line of new hydraulic straightening presses, Model VL-1, designed for handling both finished and rough work, is described in Bulletin No. VL1-44. These open side presses are of rugged reinforced welded steel construction with built-in motors. Rams are operated by direct-acting hydraulic cylinders in the head and are accurately controlled through light-pressure combination hand control and foot pedal. The bulletin lists standard and extra equipment and gives specifications on models ranging in capacity from 10 tons to 50 tons.

Mention R738 When Writing or Using Reader Service.

Electric Hand Tool

Precise Products Company, 1328 Clark Street, Racine, Wis.

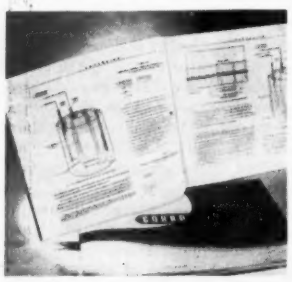
This four-page bulletin describes a high-speed electric hand tool designed to operate at 35,000 r.p.m., developing 1/6 h.p. and weighing 35 oz. Various applications are pictured, such as breaking corner on die and finishing radius to specifications; touching up a button die with the hand tool mounted in a vise; touching up transmission gears; high speed internal grinding in a lathe with the hand tool gripped in the tool post holder; polishing shell dies and regrinding lathe centers.

Mention R739 When Writing or Using Reader Service.

Corrosion

The International Nickel Company, Inc.,
67 Wall Street, New York 5, N. Y.

This 54-page publication is a convenient and comprehensive analysis of corrosion principles for both the practical man and the technician in the metal field. An



opening section explains how corrosion processes work, and discusses all the known factors that influence their action: acidity of solution, oxidizing agents, temperature, agitation, films, inhibitors, surface condition, stress, heat treatment, welding, concentration cells, and galvanic action. These discussions are illustrated in graphs, drawings and tables.

The detailed review of testing methods that follows tells how surface conditions are simulated in corrosion research. Included is a description of the construction and use of the well known spool type specimen holder for determining the comparative behavior of several metals and their alloys simultaneously under actual operating conditions. The applicability of Monel, nickel and Inconel in various corrosive media is analyzed in the closing section. Tables list nearly 500 typical corrosives in which these alloys have been successfully used, and report the results of more than 120 specific tests under varied more common corrosive agents.

Mention R740 When Writing or Using Reader Service.

Blowers

Roots-Connersville Blower Corporation, Connersville, Ind.

This four-page general bulletin, No. G-81-D, covers rotary positive blowers and gas pumps, centrifugal blowers and exhausters, rotary positive vacuum and liquid pumps, rotary displacement gas and liquid meters, and inert gas generators.

Profuse illustrations of typical installations are shown covering the principal applications such as the metal working industries, chemical and process industries and mining and smelting. Range of capacities runs up to 50,000 cu. ft. per min. when handling air or gas, at a maximum of 30 lb.

Mention R741 When Writing or Using Reader Service.

Chemicals

Glyco Products Co., Inc.,
26 Court St., Brooklyn 2, N. Y.

The 1945 edition of "Chemicals by Glyco" has just been issued with a number of additional items described, as well as the usual esters, synthetic waxes, emulsifying agents, etc., manufactured by the company. The contents have been regrouped to make for more convenient reference.

Mention R742 When Writing or Using Reader Service.

Aluminum and Zinc Castings

Monarch Aluminum Mfg. Co., Cleveland 2, Ohio.

This new 20-page catalog illustrates aluminum die castings, aluminum permanent mold, aluminum sand castings, and zinc die castings. It gives complete tables of aluminum and zinc alloys, their ASTM, Army, Navy, Federal and SAE numbers. It also presents a short history of the different processes of casting and applications. Fully and attractively illustrated in two colors, the catalog is arranged in file size for convenient reference.

Mention R743 When Writing or Using Reader Service.

Resistance Welding Equipment Standards

Resistance Welder Manufacturers Association,
505 Arch Street, Philadelphia 6, Pa.

This new booklet standardizes the nomenclature, definitions and quality of resistance welding equipment. A chart is included giving the proper electrodes to be used for spot-welding similar and dissimilar metals. Under electrical standards are tables of equivalent ratings, limits of transformer temperature rise, etc.

Mention R744 When Writing or Using Reader Service.

"Heli-Coil" Inserts

Aircraft Screw Products Co., Inc., Long Island City, N. Y.

This company has just issued two new bulletins on "Heli-Coil" inserts, precision-shaped helical coils of stainless steel or phosphor bronze wire which engage screw threads of the American National System. They provide a hard, anti-friction lining for tapped threads in light metals, plastics, and other relatively soft materials protecting these threads against wear, stripping, seizing or galling.

Bulletin No. 240 describes "Heli-Coil" insert kits for field servicing, salvage and maintenance of stud and cap screw assemblies. Bulletin No. 260 describes two interesting maintenance and salvage operations in the shops of a prominent airline and of an engine manufacturer.

Mention R745 When Writing or Using Reader Service.

Malleable Iron Facts

Malleable Founders' Society,
Union Commerce Building, Cleveland 14, Ohio.

This 4-page bulletin describes "American Malleable Iron: A Handbook," to be published by this Society. The result of two years' study and compilation, this handbook will be a thoroughgoing discussion of the manufacture and use of malleable iron. It will bring together for the first time in one unit full data on present manufacturing practice and most recent specifications. Widening adoption of malleable iron as a primary specification in many new applications has intensified the demand for such a handbook.

Chapters on casting design, pattern design, and machining practice will be included in the volume and will offer a store of practical data which will be of direct usefulness to design engineers and production men. The material composing these chapters is entirely drawn from the working practices found to be most efficient by modern manufacturers of malleable iron.

Physical, mechanical, and engineering properties of standard, pearlitic, and alloyed malleables will be set forth in other portions of the volume and correlated with requirements for the product as set up by the A.S.T.M., the Army and Navy, and other agencies responsible for current specifications. The metallurgy of malleable iron is the subject of a chapter which is unusual in the simplicity with which it explains a complicated process.

A large section will be devoted to engineering tables and data—including a tabular summary of A.I.S.I., S.A.E., and N.E. steels and irons of comparable characteristics—which should be valuable as ready reference material in production routine. Other data of similar practical usefulness will be tables of feeds and speeds for drilling, milling, and turning included in the chapter on machining practice, and a group of "design kinks" in the chapter on casting design, which will illustrate and explain a number of ingenious and efficient short-cuts in design made possible by malleable iron's unique combination of properties.

Mention R746 When Writing or Using Reader Service.

Magnesium Production

Hills-McCanna Co.,
3025 North Western Ave., Chicago 18, Ill.

This company has issued an interesting booklet describing in detail the production of magnesium castings in a "plant tour" manner. The booklet was issued in connection with a recent plant tour and display of sand castings, die castings, wrought products, and raw materials.

This company has also issued an illustrated leaflet showing the production facilities for magnesium alloy sand castings and citing the advantages of their application for reciprocating and moving parts of machinery, portable and manually handled tools, home appliances, office machines, transportation equipment, cameras, dental equipment, aircraft parts, etc.

Mention R747 When Writing or Using Reader Service.

Welded Bases and Supporting Units

Van Dorn Iron Works Co.,
2865 E. 79th St., Cleveland, Ohio

An analysis of the advantages of weldments for bases and supporting units is contained in this booklet, discussing the advantages of fabricated supporting units from performance, production and economic angles. It also focuses attention on the importance of correct design in the fabriation of such units. The 20-page book is profusely illustrated and outlines the development of welded steel construction in machine and engine design.

Mention R748 When Writing or Using Reader Service.

Plastic Coating

Amercoat Division, American Pipe and Construction Co.,
P.O. Box 3428, Terminal Annex, Los Angeles 54, Calif.

A new folder in two colors titled "Amercoat No. 33 Plastic Coating" describes the properties, uses and benefits of this general purpose, cold-applied, protective coating. It contains a wealth of factual data relative to the positive elimination of corrosion on equipment and structures of all kinds, as well as the contamination of products resulting from contact with corroded surfaces. Technical facts presented range from application, coverage, colors, to degrees of weathering, moisture absorption and transfer, and resistance to chemical fumes, splash and overflow of acids, alkalies, salts, oils, water, etc. Many proven uses in a wide spread of industries are described. Also featured is a complete list of corrosive agents to which this coating is impervious.

Mention R749 When Writing or Using Reader Service.

Testing Methods

Triplett & Barton, Inc., Burbank, Calif.

An informative booklet contains comprehensive data on the post-war possibilities of metallurgical, X-ray and other scientific testing used so extensively in the speeding of the war program. Several extraordinary examples are given, together with a complete compilation of uses made of Triplett and Barton methods.

Mention R750 When Writing or Using Reader Service.

20 Years of Plastic Surfacing

Roxalin Flexible Finishes, Inc., Elizabeth, N. J.

This elaborately illustrated and spiral bound book suggests a more extensive field of usefulness for plastic coatings on metals and other materials. Some 16 pages of this 44-page book are devoted to metal coatings and the methods used to deposit thin films of plastic on metal surfaces to improve quality and appearance.

Mention R751 When Writing or Using Reader Service.

Standard Practices for Metal Degreasing With Chlorinated Solvents

E. I. du Pont de Nemours & Co., Wilmington 98, Del.

A booklet of standard practices for degreasing metals or other non-porous materials with chlorinated solvents has been prepared by the Solvents Division of the Electrochemicals Department of Du Pont in consultation with G. S. Blakeslee & Co., and the Detrex Corp., manufacturers of degreasing equipment.

A number of typical degreasing machines are illustrated in the 10-page booklet. Vapor degreasing is used for cleaning metal parts of all kinds prior to inspection or assembly, or in preparation for subsequent processing or finishing operations such as rustproofing, painting, electroplating, anodizing and galvanizing. The essential part of the process is suspension of the material in the vapors of trichlorethylene or sometimes perchlorethylene, so that the pure condensed liquid solvent rinses the parts free of grease and oil. The booklet outlines the fundamentals of machine design, installation and operation which must be considered to insure safety and efficiency and gives a list of literature references.

Mention R752 When Writing or Using Reader Service.

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